LPC# 085 813 5001 Jo Daviess County
Bautsch-Gray Mine
ILN 000 508 088
SF/HRS

CERCLA Expanded Site Inspection Report

Prepared by:
Office of Site Evaluation
Division of Remediation Management
Bureau of Land

CERCLA
Expanded Site Inspection Report

for:

Bautsch-Gray Mine
ILN 000508088
Galena, Illinois

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Illinois Environmental Protection Agency
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Section 1.0 Introduction

On May 8, 2009, the Illinois Environmental Protection Agency's (Illinois EPA) Office of Site Evaluation was tasked by the United States Environmental Protection Agency (U.S. EPA) Region V to conduct an Expanded Site Inspection at the Bautsch-Gray Mine Site in Galena, Jo Daviess County, Illinois.

The primary objective of an Expanded Site Inspection is to address critical hypotheses or assumptions that were not completely supported during the Site Inspection. The Expanded Site Inspection will gather information to fully establish background conditions, fill in data gaps, or establish attribution to site operations. At the conclusion of the Expanded Site Inspection, it will be determined whether the site qualifies for possible inclusion on the National Priorities List (NPL) or should be dropped from further Superfund consideration. Additionally, the Expanded Site Inspection supports removal and enforcement actions and collects data to support further Superfund or other response actions.

The Expanded Site Inspection is not intended to be a detailed extent of contamination or risk assessment. Efforts requiring intensive background investigation or specialized techniques are normally conducted during the next phase in the Superfund process after a site is placed on the NPL and becomes eligible for remedial funding. The Expanded Site Inspection is performed under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) commonly known as Superfund.

The Bautsch-Gray Site was originally investigated in the form of a Pre-CERCLIS Screening Assessment in May 2000. The Pre-CERCLIS Screening Assessment

identified areas of mine tailings that migrated from the property that once contained the mining activities. The assessment prompted the site to be placed on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) data base on May 15, 2000. In October 2000, Illinois EPA conducted an Integrated Assessment at the abandoned mine site. The investigation documented the presence of mine tailings in nearby residential properties and Smallpox Creek. The investigation also documented that a nearby residential drinking water well was contaminated with inorganic constituents. Illinois EPA recommended that the Bautsch-Gray Mine Site proceed to the Expanded Site Investigation of the CERCLA process.

In October 2001, Illinois EPA conducted an Expanded Site Inspection at the Bautsch-Gray Mine Site. The investigation incorporated data from the 2000 Integrated Assessment along with new data collected within the sediments along Smallpox Creek. The results of the investigation documented that the sediments of Smallpox Creek have been impacted by mine tailings that migrated from the large waste pile.

On September 28, 2009, Illinois EPA prepared and submitted a site-specific Expanded Site Inspection workplan to U.S. EPA Region 5. The field activity portion was conducted during the week of November 16, 2009. During the 2009 Expanded Site Inspection, Illinois EPA personnel collected soil, sediment, and waste samples from the Bautsch-Gray Mine Site and surrounding areas. The data was collected in order to provide analytical information that could be used in the preparation of a Hazard Ranking System scoring package. The data will also be used to support time-critical removal activities.

Section 2.0 Site Background

Section 2.1 Site Description

The Bautsch-Gray Mine Site is comprised of an estimated 40-acre mine tailings pile located approximately four miles south of Galena, Illinois on Blackjack Road. The tailings pile can be found at the intersection of Sections 3, 4, 9, and 10 in Rice Township, Jo Daviess County (Figures 1, 2, and 3). The approximate center of the tailings pile can be found at a latitude of 42° 21' 26.72" North and a longitude of 090° 23' 54.85" West. At its highest, the mine tailings pile ascends approximately 40 feet above the surrounding terrain. The tailings pile is mostly void of vegetation with large erosion channels and gullies scattered throughout. Large pieces of metal that appear to be remnants of old mining equipment can be found throughout the site. The general slope of the tailings pile is toward Blackjack Road to the west.

Access to the mine tailings pile is somewhat restrictive with no trespassing signs posted. A large berm, composed of mine tailings, provides a natural barrier along most of the western boundary that parallels Blackjack Road. A locked gate along the northwestern boundary prohibits vehicles from entering the property. A barbed-wire fence prevents vehicular access along the southwestern boundary. There are signs of human intrusion on the mine tailings pile such as shotgun shells, beverage cans, and remnants of small fires.

Several different routes have been identified that channel excess surface water from the site. First, the most visible route is that which flows westward to an overflow pipe located near the west-central boundary of the site. The overflow pipe is channeled beneath Blackjack Road and has resulted in the formation of the settling pond west of

Blackjack Road. Second, mine tailings have migrated into ditches that parallel Blackjack Road. Once entering into the ditches, excess surface water and mine tailings empty into Smallpox Creek approximately ¼ mile north of the tailings pile. Third, recent large rain events have resulted in mine tailings flowing from the tailings pile to the west over Blackjack Road and into a residential property. The mine tailings will either settle out on the property or continue to flow in a northwest direction into a wetland area.

West of the tailings pile is a horse-shoe shaped settling pond. Illustrated in Figures 2 and 3, the settling pond consists of mine tailings that apparently have washed off of the large tailings pile to its east. It is estimated that tailings material in the settling pond varies between 4 and 20 feet in thickness. The settling pond is non-vegetated, except for a small area where cattails are growing located in the southeast corner. One residential dwelling, located west of Blackjack Road, is located on an outcropping of land that is less than 200 feet from the north, west and south sides of the settling pond. According to National Wetlands Inventory Map constructed by the United States Department of the Interior the settling pond is a Paulistrine, unconsolidated bottom, semi-permanently flooded wetland and is illustrated in Figure 4.

The western boundary of the settling pond is composed of a dam consisting of mine tailings. The dam is estimated to be approximately 20 feet above the surrounding terrain. During the 2009 Expanded Site Inspection, the dam was observed to be broken, possibly due to excess surface water and erosion. The breach in the dam is estimated to be approximately 15 feet wide and 20 feet deep. A photograph, contained in Appendix C, was taken to illustrate the broken dam. West of the dam was evidence that mine tailings had and continues to flow beyond the settling pond. The area west of

the settling pond was marshy and contained stressed vegetation. The marshy field continues less than 1/4 mile south until it intersects Smallpox Creek.

A large wetland area is located to the northwest of the Bautsch-Gray Mine Site. The wetland is located to the west of Blackjack Road and is identified in Figure 4, Wetlands Inventory Map, as a pre-emergent wetland that is seasonally flooded. During the November 2009 Expanded Site Inspection it was observed that most of the wetland was covered with six inches to one foot of water. Phragmites, small trees, and other hydrophytes were present throughout the wetland. There was a slight flow of surface water in a north to northwest direction toward Smallpox Creek. According to a 1946 aerial photograph, this area of the wetland appeared to have contained a large concentration of mine tailings. There is visual and analytical evidence of mine tailings entering the wetland.

According to topographical maps of the area, Smallpox Creek is defined as a lower perennial stream. According to information gathered from local residents, Smallpox Creek is used for trapping, canoeing, and fishing. Smallpox Creek flows into the Mississippi River near a location designated as the Upper Mississippi River Wild Life and Fish Refuge. At the request of Illinois EPA, Illinois Department of Natural Resources completed an Endangered Species Consultation on October 28, 2009. The consultation concluded that the confluence of the Mississippi River and Smallpox Creek is a Jo Daviess County Illinois Natural Area. The consultation also identified the weed shiner and western sand darter as two protected aquatic species that reside in the Mississippi River at this area of concern.

Section 2.2 Site History

Zinc mining in the Galena area has a rich history and was believed to have begun sometime during the 1850s. According to information gathered from the Jo Daviess County Tax Assessor's Office, the property on which the Bautsch-Gray Mine Site is located appeared to have been in private ownership throughout much of its existence. It is believed that during private ownership, mining companies leased mineral rights from the property owners. Mineral Point Zinc was the first known company to have operated from the site beginning in 1927 and continued until the 1940's. In 1946, Tri-State Zinc is believed to have begun mining operations in the area. The county tax records illustrate several changes in property ownership until 1969. In 1969, Eagle Picher was noted to have purchased mineral rights to portions of the site. Eagle Picher continued to have a presence at the site until at least 1979 and was the last mining entity to have operated on the property. Currently there are three separate owners of the parcels that make up the site. There are currently no mining activities that take place on the site.

While Eagle Picher was operating the site, several drawings were produced that illustrate the approximate location of the Bautsch Mine and the Gray Mine relative to other features in the area. Copies of the drawing can be found in Appendix E. The drawings indicate that the Bautsch Mine was located to the south of the operational area of the mine while the Gray Mine was located to the north. The drawing also indicates the location of a settling lagoon which corresponds to its present day location.

In 1971 Illinois EPA issued a National Pollutant Discharge Elimination System (NPDES) permit to Eagle Picher Industries to discharge wastewater into Smallpox

Creek. A map, accompanying the permit application, indicated that the Bautsch Mine and Gray Mine both contributed to the mine tailings that were present east of Blackjack Road. The NPDES permit was due to expire on October 1, 1979. There is no file information that would suggest that the permit was ever renewed after that time.

An aerial photograph from 1946 indicates that the settling pond was not present during that time. It appears that waste material generated from the site may have flowed directly into Smallpox Creek as illustrated by a defined channel in the 1946 aerial photograph. A copy of the 1946 aerial photograph can be found in Appendix E. The first visible sign of the surface impoundment can be found in a 1970 aerial photograph.

On July 1, 1999, the gate to the site was found to be unlocked and standing open by the Illinois EPA Rockford Regional Office. The Rockford Regional Office personnel found heavy equipment on site that was being used to load mine tailings from the site and into trucks. Immediately following, the owners of the equipment were notified that the tailings were not to be used as clean fill. In May 2000, Illinois EPA issued a press release that warned the public of potential risks related to mine tailings. The press release stated that mine tailings were being removed from the Bautsch-Gray Mine Site for personal and commercial use. Illinois EPA's Director Thomas Skinner stated that, "lead tailings from mining activities are not safe to use for fill."

Illinois EPA conducted an Integrated Assessment in October 2000. Analytical results from the Integrated Assessment documented the presence of mine related waste in nearby residential properties and Smallpox Creek. The Integrated Assessment also documented that a nearby private drinking water well had been impacted by the presence of the mine tailings at the Bautsch-Gray Mine Site. Following the inspection,

Illinois Department of Public Health recommended that the resident stop using the well for drinking purposes. Currently the resident only consumes bottled water.

In 2001 Illinois EPA conducted sediment sampling activities event within Smallpox Creek for the purpose of determining the impact to this perennial water body. The data was compiled in an Expanded Site Inspection report and was submitted to U.S. EPA Region 5 in March 2002. The inspection documented the presence of heavy metals along two separate drainage routes that enter Smallpox Creek. The sediments within Smallpox Creek were also found to have heavy metal contamination.

Section 2.3 Previous Investigations

During the summer 2009, excess rain resulted in mine tailings washing off the waste pile and migrating over Blackjack Road into a nearby residential property. Illinois EPA was notified of the situation by the Jo Daviess County Highway Department in August 2009. Just after the large rain event, Blackjack Road had an estimated 1-2 feet of mine tailings on the road. The incident prompted an investigation on August 18 and 24, 2009, by Illinois EPA. During the investigation Illinois EPA personnel collected samples from the waste pile, roadside ditch, and a residential property near the Bautsch-Gray Mine Site. The results indicated that elevated levels of lead, zinc, cadmium, and arsenic were present in material that washed off the tailings pile. The results also prompted a request by Illinois EPA for a time-critical removal action to be conducted by U.S. EPA Region 5.

During the week of October 26, 2009, U.S. EPA's Emergency Response Program, their contractors, and Illinois EPA collected additional data for establishing an

imminent and substantial threat posed by the Bautsch-Gray Mine Site. At the time of this Expanded Site Inspection Report, U.S. EPA is negotiating with Potentially Responsible Parties (PRP's) to address the threat posed by the site.

Section 2.4 Regulatory Status

Based upon available file information the Bautsch-Gray Mine Site does not appear to be subject to Resource Conservation and Recovery Act (RCRA) corrective action authorities. Information currently available does not indicate that the site is under the authority of the Atomic Energy Act (AEA), Uranium Mine Tailings Action (UMTRCA), or the Federal Insecticide Fungicide or Rodenticide Act (FIFRA).

Section 3.0 Expanded Site Inspection Activities

Section 3.1 Sampling Activities

Section 3.1.1 Waste Pile Sampling

The samples from the tailings pile were collected using a stainless steel trowel. The waste pile samples were gathered to determine the analytical contents of the mine tailings and provide a basis from which to compare other sample results. These samples were collected using the protocol set forth by Illinois EPA's Bureau of Land sampling procedures.

The waste pile samples were collected within the upper six inches of material. Each sample received an analysis for Target Analyte List (TAL) metals and cyanide. One sample also received Toxicity Characteristic Leaching Procedure (TCLP) analysis

for inorganics. Table 1 provides a description of each waste pile sample noting its collection time, collection date, depth, physical appearance, and its general location.

A complete list of TAL metals and cyanide can be found in Appendix B. Samples designated with an "X" prefix represent those that were analyzed for TAL compounds or elements. Samples designated with a "T" prefix indicate that a TCLP analysis was conducted on that sample. A summary of the results that received a TAL analysis can be found in Table 3. Table 7 contains a summary of the TCLP results. A complete set of laboratory data can be found in Volume 2 of the Expanded Site Inspection Report.

Samples X301 through X305 were collected at various locations on the mine tailings pile. Each location was chosen to obtain a better understanding of the inorganic content of the mine tailings. Figure 5 illustrates the locations of each waste sample.

Section 3.1.2 Sediment Sampling

During the Expanded Site Inspection, sediment samples were collected from Smallpox Creek, the settling pond, and wetland using different methods and techniques. Most locations within Smallpox Creek were physically accessed using a canoe while the rest were accessed using chest waders. Each sample was collected with a stainless steel auger or trowel according to Illinois EPA's Bureau of Land sampling procedures. One sediment sample location was also analyzed using TCLP methods for inorganics. Table1 provides a description of each sediment sample with its sample time, sample date, depth beneath the water, depth within the sediment, and physical appearance.

The sediment samples were analyzed for TAL metals and cyanide. A complete list of TAL metals and cyanide can be found in Appendix B. Maps illustrating the

location of each sediment sample that received a TAL analysis can be found in Figures 5 and 6. Samples designated with an "X" prefix represent those that were analyzed for TAL metals and cyanide. Samples designated with a "T" prefix indicate that a TCLP analysis was conducted. Tables 3, 5, and 6 contain the sample results from the settling pond, Smallpox Creek, and the wetland respectively. The summary of the TCLP sample results can be found in Table 7. A complete set of laboratory data can be found in Volume 2 of the Expanded Site Inspection Report.

Samples X211 through X214 were collected from the large wetland located northwest of the Bautsch-Gray Mine tailings pile. The wetland provides a route for surface water to drain into Smallpox Creek from the tailings pile. These samples were collected in order to determine if mine tailings may have impacted this pre-emergent wetland.

Samples X215 through X217 were collected from the settling pond west of Blackjack Road. Visually, it appears that mine tailings are present in the settling pond. The sample locations were chosen in order to determine if the material may be similar to that found in the mine tailings.

Samples X201 through X210 and X219-A through X221-B were collected from the sediments of Smallpox Creek. The samples were collected at various depths within the sediments in order to determine if Smallpox Creek has been impacted by the activities at the Bautsch-Gray Mine Site. Samples X219-A, X219-B, X220, X221-A, and X221-B were collected upstream and will be used for comparative background samples.

Section 3.1.3 Soil Sampling

Soil samples were collected within the top two inches from various locations around the Bautsch-Gray Mine Site using a stainless steel trowel. These samples were collected in accordance to Illinois EPA's Bureau of Land sampling procedures. One soil sample location also received an analysis for TCLP inorganics. Table 1 provides a description of each sample while noting is sample time, sample date, depth, approximate location, and physical appearance.

The soil samples were analyzed for TAL metals and cyanide. A complete list of TAL compounds and analytes can be found in Appendix B. Samples designated with an "X" prefix represent those that were analyzed for TAL metals and cyanide. Samples designated with a "T" prefix indicate that a TCLP method was conducted on that sample. Table 4 contains a complete summary of TAL soil sample results. A summary of the TCLP data can be found in Table 7. Figure 5 is a map that illustrates the location of each soil sample. A complete set of laboratory data can be found in Volume 2 of the Expanded Site Inspection Report.

Soil samples X103 through X108 were collected from an overland flow route leading from the settling pond to Smallpox Creek. This area is well defined by the presence of mine tailings and stressed vegetation. There is a slight flow of surface water toward the west and southwest. These samples were collected to determine if mine tailings were continuing to migrate beyond the settling pond into Smallpox Creek.

Samples X101 and X102 were taken for the purpose of establishing background soil conditions around the mine tailings area. Sample X101 was collected just to the south of the mine tailings pile while Sample X102 was collected just to the north. These

sample locations were chosen due to their proximity to the site but also appears to be not influence by past site activities.

Section 3.2 Analytical Results

Following the collection of the samples, they were transferred to containers provided by Illinois EPA's Contract Laboratory Program. The sample containers were packaged and sealed in accordance with Illinois EPA's Office of Site Evaluation sampling procedures. Soil, sediment, and waste samples requiring a TAL analysis were sent to Liberty Analytical Corporation and Bonner Analytical. Those samples that were analyzed using TCLP methods were sent to U.S. EPA's Central Regional Laboratory (CRL). A complete analytical data package for the Bautsch-Gray Mine Site can be found as Volume 2 of the Expanded Site Inspection Report.

The criteria used to determine an observed release is based upon analytical samples that are at least three times background concentrations. Samples that meet or exceed these criteria will be used to evaluate the site using the Hazard Ranking System.

The analytical results of waste samples X301 through X305 revealed the presence of inorganics that met or exceeded observed release criteria. Specifically, arsenic, cadmium, lead, copper, nickel, and zinc were the specific metals detected in the highest concentrations. These samples were collected from the waste pile on the Bautsch-Gray Mine Site and can be attributable to past mining activities. The waste samples were compared to background soil samples X101 and X102. A summary of the waste samples can be found in Table 2.

Samples X215 through X218 represent sample locations collected from the surface impoundment. When compared to background soil samples X101 and X102, each location contained levels of lead, zinc, arsenic, cadmium, and copper that met observed release criteria. The material in the surface impoundment was both physically and analytically similar to the up-gradient tailings pile and can be attributed to past mining activities. Table 3 contains a summary of the analytical results.

The collection of sediment samples from Smallpox Creek indicated that elevated levels of inorganic contamination were present. Specifically lead, zinc, arsenic, cadmium, and copper were at levels that met observed release criteria when compared to background samples X219-A, X219-B, X220, X221-A, and X221-B. The specific contaminants are similar to those found within the sources associated with the Bautsch-Gray Mine Site. Table 5 illustrates the levels of inorganics within the sediment samples of Smallpox Creek.

The analysis of soil samples X103 through X108 indicated that inorganic contamination was present along the overland flow route. Once past the surface impoundment, lead, zinc, arsenic, cadmium, and copper were detected at levels that met the observed release criteria. Their attribution can be linked to up-gradient sources, specifically the surface impoundment and tailings pile. The results of the samples were compared to background soil samples X101 and X102. A summary of the laboratory samples can be found in Table 4.

Samples X211 through X214 represent sediment sample locations collected from the wetland located northwest of the Bautsch-Gray Mine tailings pile. In three of the four samples, only zinc was detected at levels met the observed release criteria. The

results indicated that portions of the wetland may be impacted by past mining activities. Table 6 contains a summary of the analytical results collected from the wetland.

Section 3.3 XRF Data and TCLP Results

Prior to sample collection of all media, an X-Ray Fluorescence (XRF) Metal Analyzer was used to determine the levels of inorganics (metals). Based upon the results, a determination was made to collect and analyze a sample for laboratory purposes. Although not used for the Hazard Ranking System, the XRF data provides additional information on many areas in the investigative site. A summary of the XRF results can be found in Table 8.

Three samples were collected and analyzed for TCLP metals. When compared to TCLP values set forth in Subtitle G of Title 35 of the Environmental Protection Act, all three locations exceeded values for lead. One location was chosen from the waste pile, surface impoundment, and the overland flow. Although TCLP data was not used to evaluate the Bautsch-Gray Mine Site for Hazard Ranking System purposes, this analytical information will assist state and/or federal programs in making site specific hazardous waste determinations. A summary of TCLP results can be found in Table 7.

Section 4.0 Site Sources

This section includes descriptions of the various hazardous waste sources that have been identified at the Bautsch-Gray Mine Site. The Hazard Ranking System defines a "source" as: "Any area where a hazardous substance has been stored, disposed or placed, plus those soils that have become contaminated from the migration

of hazardous substances." This does not include surface water or sediments below surface water that has become contaminated.

Information obtained during the Expanded Site Inspection identified three separate areas of contamination at the Bautsch-Gray Mine Site. Figure 7 illustrates the location of each source with their approximate boundaries. As additional information becomes available, the possibility exists that additional sources of contamination may be found.

Section 4.1 Mine Tailings Pile (Waste Pile)

The Bautsch-Gray Mine Site contains a large area that was used for the disposal of waste material. The material that is present on the site has the general appearance of gray/brown beach sand with dark striations throughout. The material is very porous and contains large pieces of metal that once made up the mining operations. Throughout the tailings pile are eroded valleys and channels that generally slope toward the west. There are large, "canyon-like" ridges throughout the central portion of the tailings pile in which birds burrow into the side walls for nests. Photographs were taken of the birds dwellings and can be found in Appendix C. Observations made during the Expanded Site Inspection indicated that the tailings pile, at its highest point, is approximately 40 feet above the surrounding terrain.

Samples X301 – X305 were collected from the waste pile and contained levels of arsenic, cadmium, lead, copper, nickel, and zinc that met or exceeded observed release criteria when compared to background Samples X101 and X102. The type of inorganic contamination can be attributable to activities that once took place on the Bautsch-Gray

Mine Site. Using a scaled map, it was determined that the waste pile is approximately 40 acres.

There is no indication that a liner is present beneath the tailings pile. The surface of the waste pile is mostly void of any vegetation. A berm, composed of mine tailings, exists along the western boundary but does not appear to completely contain the material. An overflow tube is present along the west-central portion of the tailings pile that allows excess surface water and mine tailings to flow west beneath Blackjack Road and into a settling pond. There is visual evidence that material from the waste pile has migrated from this source to the north, west, and south.

Section 4.2 Settling Pond (Surface Impoundment)

According to Illinois EPA file information, the settling pond was constructed by Eagle Picher prior to 1970 in order to dewater mine tailings. An aerial photograph from 1970 indicates that the settling pond was in place at that time. The settling pond utilized the natural contours of the land along with a dam along the western boundary to retain tailings material. The tailings material enters the settling pond by way of an overflow pipe originating from the tailings pile. The overflow pipe travels beneath Blackjack Road and emerges along the eastern boundary of the settling pond.

Samples X215 – X218 were collected within the area designated as the settling pond. When compared to background samples X101 and X102, levels of arsenic, cadmium, lead, copper, and zinc met or exceeded observed release criteria. The areas from which the samples were collected were visibly and analytically similar to those found up-gradient. Using data collected in November 2009 by U.S. EPA's Field

Environmental Decision Support (FIELDS) group indicated that the settling pond was approximately 4.8 acres in size.

There is no information that suggests that a liner was placed beneath the settling pond when it was constructed. The surface of the settling pond is mostly void of vegetation with only a small area of cat tail plants located along the southern portion. The area remains slightly accessible to the public with limited accessibility from Blackjack Road. In November 2009, it was noted that the western dam of the settling pond has broken. Since the break in the dam, there is nothing impeding the migration of mine tailings from moving toward Smallpox Creek via the overland flow. There is a residential dwelling located within 50 feet of the settling pond.

Section 4.3 Overland Flow (Contaminated Soil)

Tailings material that was once present in the settling pond has resulted in an area of contaminated soil. After the mine tailings migrate from the settling pond, they follow the natural contour of the terrain. The terrain has a slight slope that appears to be toward the west and southwest. Due to the topography, the mine tailings are spread throughout the area in a "fan-shaped" pattern. This "fan-shaped" pattern contains mine tailings on the surface and stressed vegetation throughout.

The contaminated soil can be identified by using Samples X103 through X108. These samples were taken in the area believed to have been impacted by the overflow of mine tailings. When compared to soil background Samples X101 and X102, all five locations contained levels of arsenic, cadmium, lead, copper, and zinc that met or exceeded observed release criteria. These inorganic contaminants can be attributed to

those found in up-gradient sources. Sediment Samples X206 and X207 were two locations in Smallpox Creek that indicated that the overland flow was entering the creek. Using a scaled aerial photograph and visual observations made during the Expanded Site Inspection, an area of 4.9 acres of contaminated soil was determined. Historical aerial photography also visually illustrates the presence of a light colored material believed to be mine tailings.

The overland flow route provides a mechanism for tailings material to migrate from the settling pond into Smallpox Creek. This source is not contained to prevent excess surface water from carrying additional tailings along this route. As mentioned in Section 4.2, the dike that has suppressed the tailings within the settling pond has broken. Due to this break, the overland flow continues to be impacted from mine tailings flowing from the settling pond. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Map, portions of the overland flow are located within the 100-year flood zone.

Section 4.4 Other Potential Sources

The Expanded Site Inspection also revealed an additional source of contamination to Smallpox Creek not associated with Bautsch-Gray Mine. Sediment samples collected up-gradient from the primary PPE associated with Bautsch-Gray Mine indicated elevated levels of inorganic contamination within Smallpox Creek. Further investigation revealed that a mine tailings pile associated with the abandoned Marsden-Blackjack Mine may be contributing to additional contamination within Smallpox Creek. The Marsden-Blackjack Mine is one of the oldest mines in the Galena

area and originally operated from 1854 until 1968. At least two large piles of waste rock remain on the property that appears to be possibly impacting Smallpox Creek. Additional information in the Marsden-Blackjack Mine area may be needed to better understand its impact to Smallpox Creek.

Section 5.0 Migration Pathways

As identified in CERCLA's Hazard Ranking System, the Office of Site Evaluation evaluates three migration and one exposure pathway. Sites are evaluated on their known or potential impact these pathways have on human health and the environment. The following paragraphs will evaluate the groundwater, surface water, soil exposure, and air migration pathways.

Section 5.1 Groundwater

Previous site investigations have indicated that three bedrock aquifers are present in the vicinity of the Bautsch-Gray Mine Site. Jo Daviess County lies within the Driftless Area of Northwest Illinois, so-called due to the lack of glacial drift overlying the bedrock. The most shallow bedrock aquifer provides drinking water to most of the area residents and is located generally 0 – 60 feet below ground surface. There are two other aquifers located between 350 and 1300 feet below the ground surface. Jo Daviess County geology is characterized as karst which contains many crevices that may interconnect drinking water aquifers.

Sections 4.1, 4.2, and 4.3 have documented the presence of three sources of mine tailings throughout the area. Analysis of each source area indicated the presence

of inorganic contamination as well as visual observation of mine tailings. Mine tailings are fine-grained material that would allow surface water to percolate through, thus infiltrating into the shallow groundwater beneath. From each source area, one sample was analyzed for TCLP inorganics during the Expanded Site Inspection. The results of the TCLP analysis indicated that the inorganic contaminants have the ability to leach to the underlying groundwater aquifer.

No groundwater samples were collected by Illinois EPA during the Expanded Site Inspection. On October 6 and 7, 2009, U.S. EPA's contractors collected drinking water samples from two residents in the area of the Bautsch-Gray Mine Site. Of the two groundwater samples, one location exceeded Maximum Contaminant Levels (MCL's) for lead. This is the same resident that was identified in early investigations that exceeded MCL's in 2000. Following the CERCLA investigation in 2000, that resident was contacted by the Illinois Department of Public Health with the recommendation to use an alternative source of water for drinking purposes. At the time of this Expanded Site Inspection, the resident continues to not use their groundwater well for drinking purposes.

Section 5.2 Surface Water

According to field observations and topographic maps of the area, excess surface water from the Bautsch-Gray Mine Site could flow in three separate directions. Regardless of the three routes, each empties into Smallpox Creek and eventually the Mississippi River. The following paragraphs will describe each route in greater detail.

First, excess surface water flow could travel north within the ditches that parallel Blackjack Road. This is evident by the mine tailings that are visible in the ditches to the east of Blackjack Road. Surface water travels approximately ¼ mile to the north before emptying into Smallpox Creek just east of the Blackjack Road Bridge. Sampling activities conducted during the Expanded Site Inspection did not clearly indicate that this route is contributing to the sediment contamination of Smallpox Creek.

The second route became prominent during heavy rain activities during the summer of 2009. Excess surface water migrated west across Blackjack Road and into a residential property. The surface water has carried excess mine tailings and deposited them on Blackjack Road and within the residential property. From the residential property, excess surface water continues to travel in a northwest direction following the natural contours of the land before reaching a wetland approximately 0.1 mile from the mine tailings pile. Once reaching the wetland there is no discernable flow, but there are several ditches that channel the water toward Smallpox Creek to the north, northwest, and west. Expanded Site Inspection data did not indicate that this route is contributing to the sediment contamination in Smallpox Creek from the Bautsch-Gray Mine Site.

The third route is the most analytically and visibly documented to be impacting Smallpox Creek. Excess surface water and mine tailings are channeled to the west from the mine tailings pile to the settling pond. From the settling pond, excess surface water and mine tailings migrate west and follow the natural contours of the land before reaching Smallpox Creek approximately 0.2 miles from the settling pond. During the 2009 Expanded Site Inspection, a break was noticed in the dam that once contained the

material in the settling pond. Due to this break, there is a continuing uncontrolled migration of surface water and mine tailings using this route. It is this route that will be used as the Probably Point of Entry (PPE) for this Expanded Site Inspection.

Before entering the PPE, surface water has flowed from the mine tailings pile into the settling pond. From the settling pond, excess surface water follows the natural contour of the terrain forming a "fan-shaped" area of contaminated soil. This area of contaminated soil empties into Smallpox Creek at Samples X206 and X207. Sample X206 is the furthest up-gradient location thus designates the PPE. Sample X206 was collected from Smallpox Creek and contains the same inorganic analytes as those detected in up-gradient sources. Once present in Smallpox Creek, surface water continues to flow for 2.7 miles before joining with the Mississippi River. Once present in the Mississippi River, the flow continues south for an additional 12.3 miles before reaching the 15-mile Target Distance Limit (TDL) near mile marker 550. A map illustrating the 15-mile TDL can be found in Appendix A.

Smallpox Creek is listed as a lower perennial water body according to U.S. Geological Survey topographical maps. According to Federal Emergency Management Agency National Flood Insurance Maps, Smallpox Creek is located within the 100-year flood plain boundary. The Illinois Department of Natural Resources (IDNR) regulates trapping along Smallpox Creek and portions of the Mississippi River. The Mississippi River is used for recreational and commercial fishing according to IDNR. Interviews with local residents have revealed that portions of Smallpox Creek have been used for recreational fishing and canoeing. According to Illinois EPA file information, there are no known surface water intakes within the TDL.

At the request of Illinois EPA, IDNR completed an Endangered Species Consultation on October 28, 2009. The consultation concluded that Smallpox Creek empties into a Mississippi River Backwaters area which is designated as a Jo Daviess County Illinois Natural Area. Also, the weed shiner and western sand darter were two protected aquatic resources located in the backwaters of the Mississippi River at this location.

Sampling data collected during the Expanded Site Inspection indicate that inorganic contaminants have migrated into Smallpox Creek from the Bautsch-Gray Mine Site. Samples X206, X207, X208, X209, and X210 contained various levels of lead, zinc, arsenic, cadmium, and copper that met or exceeded observed release criteria when compared to comparable background levels. These specific contaminants can be attributable to up-gradient sources and the Bautsch-Gray Mine Site.

Section 5.3 Soil Exposure

Since at least 1927, mining activities have been taking place at the Bautsch-Gray Mine area. Throughout its existence, at least three different companies operated at this location until 1979. Past mining activities have resulted in at least three separate source areas that contain elevated levels of inorganic contamination. Specific information regarding these source areas are describe in greater details in Section 4.0 of the Expanded Site Inspection Report.

All of the source areas contained inorganic contamination within the top two feet of the surface that can be linked to past mining activities. Due to the lack of vegetative cover on some of the source areas, their surfaces are prone to erosion. None of the

source areas are completely fenced but due to their remote locations trespassing appears to be minimal. The nearest permanent resident is located approximately 50 feet from the Bautsch-Gray Mine settling pond. According to the Illinois Department of Natural Resources, there are no sensitive environments, other than wetlands, on the site or within ½ mile. There are signs of stressed vegetation in all of the impacted areas.

Information gathered from the Soil Survey of Jo Daviess County, the Bautsch-Gray Mine Site area has three different classifications. The large tailings pile has been designated as a dump characterized by deep accumulation of mine refuse and can be easily eroded. The settling pond has been designated in the soil survey as containing water although due to the permeable nature of the mine tailings, very little water is actually present. The overland flow route has been designated as Wakeland Silt Loam. This type of material is somewhat poorly drained, is frequently flooded, and can be found on flood plains.

During the Expanded Site Inspection, five soil samples were collected from the overland flow route. Each location indicated that lead, zinc, arsenic, cadmium, and copper were present at levels that exceeded observed release criteria. These contaminants were also related to up-gradient sources and can be attributed to past mining activities. There were signs of stressed vegetation throughout this area.

Four samples were collected from the large wetland located northwest of the tailings pile. Photographs of past rain events have documented that excess mine tailings from the pile have migrated into this wetland. Sample X211 indicated that elevated levels of zinc were present at the most up-gradient location within the wetland.

Additional down-gradient sampling, however, did not indicate that elevated levels of zinc or other inorganic contaminants were present. Since a direct connection could not be made with Smallpox Creek, this wetland was evaluated as a terrestrial sensitive environment. Within this wetland, hydrophytes and standing water was present that indicated an area important to the unique biotic community existed.

Using U.S. Geological Survey topographical maps and U.S. Census data, an estimated 129 people reside within one-mile of the site. A map illustrating the 4-mile distance rings can be found in Appendix A.

nearby population within one-mile of the site

Distance (mi)	Population
0 - 1/4	14
0 - ½	31
½ - 1	84
Total	**129**

The number of people was calculated using 2.40 people per household in Jo Daviess County, as established by the U.S. Census Bureau, 2000.

Section 5.4 Air Route

No data was collected during the Expanded Site Inspection. Although no formal air data was collected several source areas have been identified to contain elevated levels of inorganic contamination on their surface and void of vegetation. Much of the contaminated sources consist of mine tailings. Mine tailings are mostly fine-grained material similar to sand. This type of material could easily become suspended in air during dry and windy conditions. There are two residential properties located within 200 feet of the site. An estimated 924 people reside within a 4-mile radius of the site. A 4-Mile Radius Map can be found in Appendix A.

Individuals potentially exposed to air-borne contaminants

Distance (mi)	Population
0 - 1/4	14
0 - ½	31
½ - 1	84
1 - 2	78
2 - 3	170
3 - 4	547
Total	**924**

The number of people was calculated using 2.40 people per household in Jo Daviess County, as established by the U.S. Census Bureau, 2000.

Section 6.0 Additional Risk-Based Objectives

This section discusses additional risk-based objectives used to evaluate the Bautsch-Gray Mine Site. These objectives are not be used to evaluate the site for Hazard Ranking System purposes.

Section 6.1 Sediment Quality Guidelines

Sediment samples that were collected during the Expanded Site Inspection were compared to ecological benchmarks to help determine whether site activities have impacted the surface water pathway. Two different ecological benchmarks were used for this comparison: Ontario Sediment Quality Guidelines (Ontario) and U.S. EPA Ecotox thresholds. Ontario standards are non-regulatory ecological benchmark values that serve as indicators of potential aquatic impacts. Levels of contaminants below Ontario benchmarks indicate a level of pollution that has no effect on the majority of sediment-dwelling organisms. Levels of contaminants above a severe effect Ontario

benchmark can cause a pronounced disturbance of the sediment dwelling community. Ecotox thresholds are ecological benchmarks above which there is sufficient concern regarding adverse ecological effects to warrant further site investigation. Ecotox thresholds and Ontario Sediment Quality Guidelines are to be used for screening purposes and are not be used as regulatory, site-specific cleanup standards or remediation goals.

ECOTOX Thresholds

Compound	Benchmark	X200	X201-A	X201-B	X202	X203	X204
Lead	**47**	113	NA	NA	213	NA	101
Zinc	**150**	1570	3760	151	6490	4680	4650
Cadmium	**1.2**	5.8	6.9	NA	16.7	12.6	11.9
Arsenic	**8.2**	20.8	NA	NA	24.8	9.8	11.1

* values reported in parts per million (ppm)
* NA – represents data below the Ecotox benchmark

Compound	Benchmark	X205	X206	X207	X208	X209	X210
Lead	**47**	95.1	986	533	127	357	2070
Zinc	**150**	4270	5070	4320	1530	2540	9490
Cadmium	**1.2**	10.8	12.5	10.6	3.5	5.9	24.9
Arsenic	**8.2**	11.1	11.9	20.6	NA	NA	33.9

* values reported in parts per million (ppm)
* NA – represents data below the Ecotox benchmark

Ontario Sediment Quality Data

Compound	Benchmark	X200	X201-A	X201-B	X202	X203	X204
Lead	**250**	NA	NA	NA	NA	NA	NA
Zinc	**820**	1570	3760	NA	6490	4680	4650
Cadmium	**10**	NA	NA	NA	16.7	12.6	11.9
Arsenic	**33**	NA	NA	NA	NA	NA	NA

* values reported in parts per million (ppm)
* benchmark values are severe effect levels
* NA – represents data below the Ontario benchmarks

Compound	Benchmark	X205	X206	X207	X208	X209	X210
Lead	**250**	NA	986	533	NA	357	2070
Zinc	**820**	4270	5070	4320	1530	2540	9490
Cadmium	**10**	10.8	12.5	10.6	NA	NA	24.9
Arsenic	**33**	NA	NA	NA	NA	NA	33.9

* values reported in parts per million (ppm)
* benchmark values are severe effect levels
* NA – represents data below the Ontario benchmarks

Section 7.0 Summary

During November 2009, Illinois EPA conducted an Expanded Site Inspection at the Bautsch-Gray Mine Site in Galena, Illinois. The Expanded Site Inspection was conducted in order to determine the impact that the abandoned mine has had on the surrounding properties and drainage ways. The investigation also prompted a referral for a time-critical removal action to be conducted by U.S. EPA Region 5. The Expanded Site Inspection is intended to gather the necessary information needed to list the site on the National Priorities List and support any future removal activities at the site.

The neglect that has occurred on the abandoned mine property has allowed the migration of mine tailings to nearby properties and water bodies. The property has been dormant to mining activities for at least 30 years and continues to deteriorate. Three distinct sources of contamination have been identified with the site; 40 acre mine tailings pile, 4.8 acre surface impoundment, and 4.9 acres of contaminated soil. Each source continues to be uncontrolled and contain elevated levels of lead, cadmium, zinc, arsenic, and copper.

In 2000 a CERCLA Integrated Assessment identified contaminated groundwater within a nearby residential drinking water well. Following the assessment, the Illinois Department of Public Health recommended that the resident cease use of the well for drinking purposes. The resident has been on bottled drinking water since that time. Since the 2000 investigation no additional drinking water wells were found to contain elevated levels of metals.

The 2009 Expanded Site Inspection found that the sediments of Smallpox Creek have been impacted by the uncontrolled migration of mine tailings originating from the

Bautsch-Gray Mine Site. Five samples from Smallpox Creek have documented the presence of inorganic contamination similar to that found in up-gradient sources associated with the Bautsch-Gray Mine Site. Smallpox Creek flows for approximately 2.7 miles before reaching the Mississippi River. Smallpox Creek is a perennial water body that is used for trapping, fishing, and canoeing. The Mississippi River is a fishery and contains two protected aquatic species near the confluence with Smallpox Creek.

The three source areas that were identified during the Expanded Site Inspection found that contaminated material was located within the upper two feet. These source areas, although located in a lowly populated area, remain slightly accessible to human intrusion. Due to these concerns, the soil exposure route remains an area of concern for this site.

As noted throughout the report, areas that contain mine tailings are typically not vegetated. This lack of vegetation would not prevent surface materials from being dispersed by wind. Although no air sampling was conducted during the Expanded Site Inspection, wind erosion may contribute to the transportation and depositions of contaminated mine tailings to surrounding areas and nearby residents.

A large wetland is located to the northwest of the mine tailings pile. It appears that excess surface water and mine tailings may flow from the tailings pile toward this wetland. Although it appears that the wetland receives excess surface water flow, analytical results from the Expanded Site Inspection did not reveal excess levels of inorganic contamination in this area.

While the Expanded Site Inspection was in progress, U.S. EPA and their contractors were in the process of conducting time-critical removal activities at the

Bautsch-Gray Mine. The time-critical removal action has been focusing upon a nearby residential drinking water well, a nearby residential yard, roadside ditches that parallel Blackjack Road, and the mine tailings pile. At the time of this report, U.S. EPA is currently negotiating with the Potentially Responsible Parties (PRP's) for the cleanup of these areas that meet time-critical removal criteria. The time-critical removal activity will only address those site conditions that meet imminent and substantial endangerment criteria.

Section 8.0 References

Illinois Environmental Protection Agency, Bureau of Land: file for Bautsch-Gray Mine, LPC# 0858135001

National Oceanic and Atmospheric Administration, National Weather Service, Precipitation Frequency Data Server for Illinois, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/il_pfds.html

Illinois Department of Natural Resources, Impact Assessment, Ecological Compliance Assessment Tool for Illinois, http://dnrecocat.state.il.us/ecopublic/

Federal Emergency Management Agency, Flood Insurance Map, County of Jo Daviess, January 18, 1984, Panel Number 170902 0150 B

Illinois Department of Transportation aerial photographs, Bureau of Location and Environment, Aerial Survey Section

Agency for Toxic Substance and Disease Registry, Tox FAQ's for Lead, Zinc, Cadmium, and Arsenic, ATSDR web site; http://www.atsdr.cdc.gov/toxfaq.html

United States Census Bureau, census data for Jo Daviess County, Illinois, web site; http://www.census.gov/geo/www/maps/

Illinois Natural Resources Geospatial Data Clearinghouse, Illinois State Geological Survey, Aerial Photography and Topographical Maps for Bellevue-Iowa Quadrangle, Hanover Quadrangle, Springbrook-Iowa Quadrangle, Green Island-Iowa-Illinois Quadrangle, Scales Mound West Quadrangle, Galena Quadrangle; http://www.isgs.edu/nsdihome/

A History of the Upper Mississippi Valley Lead Zinc District, Patty Verzal, 2002, http://www.uwplatt.edu/geography/mines/history.html

The Mississippi Valley Historical Review volume IV, Published by The Mississippi Valley Historical Association, June 1917 to March 1918

History of Jo Daviess County, http://genealogytrails.com/ill/jodaviess/history1904.html

Documentation and Analysis of a Massive Rock Failure at the Bautsch-Mine, Galena, Illinois, United State Department of the Interior, Jack Touseull and Charles Rich, Jr., 1980

Preliminary Compilation of Descriptive Geoenvironmental Mineral Deposit Models, Chapter 2, Bioavailability of Metals, U.S. Department of the Interior, U.S. Geological Survey, David A. John and Joel S. Leventhal, 1995, http://pubs.usgs.gov/of/1995/ofr-95-0831/CHAP2.pdf

Site Assessment Report for Bautsch-Gray Mine Site, Prepared by Weston Solutions Incorporated for United States Environmental Protection Agency, Region 5, March 9, 2010.

FIGURES

AND

TABLES

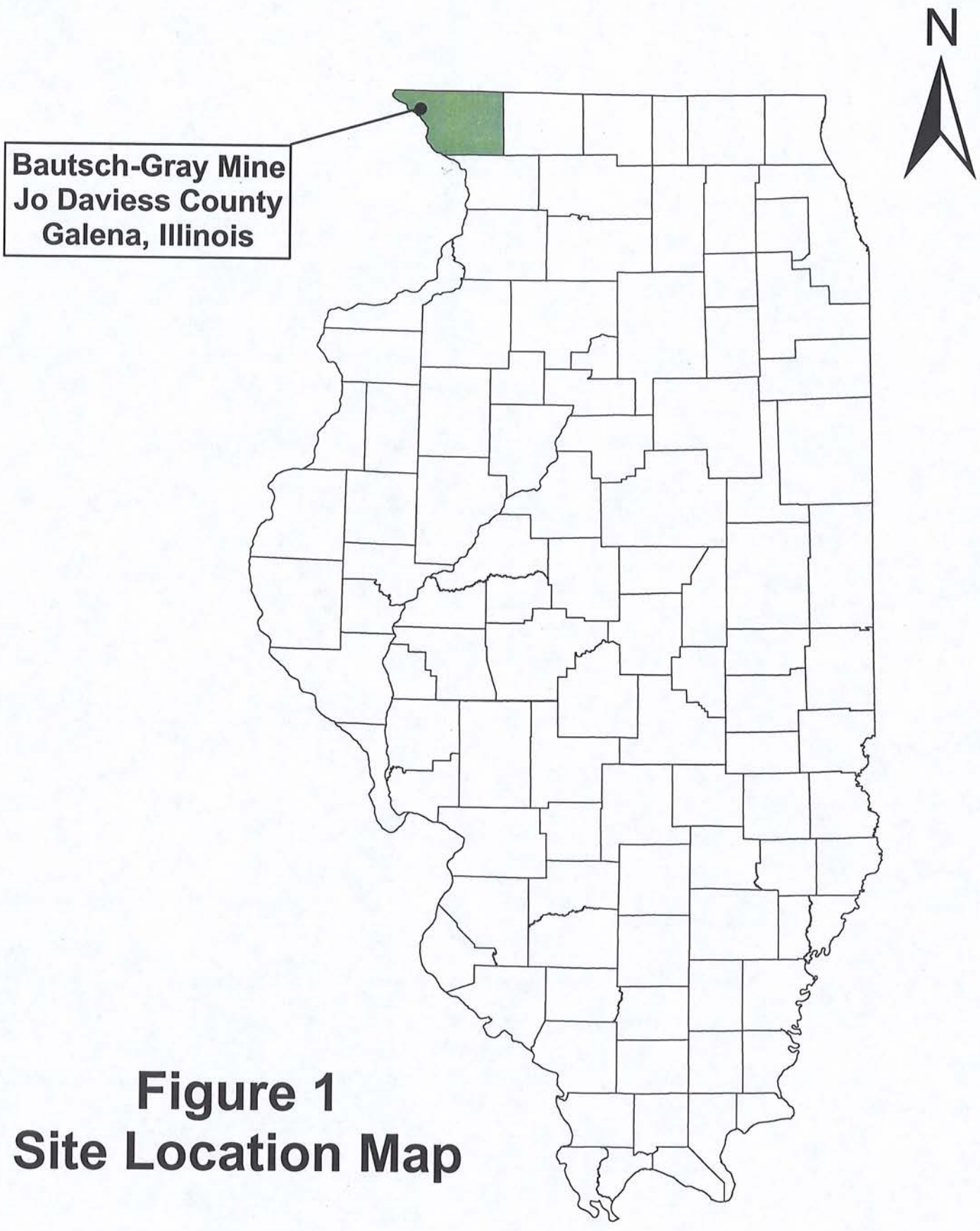

Figure 1
Site Location Map

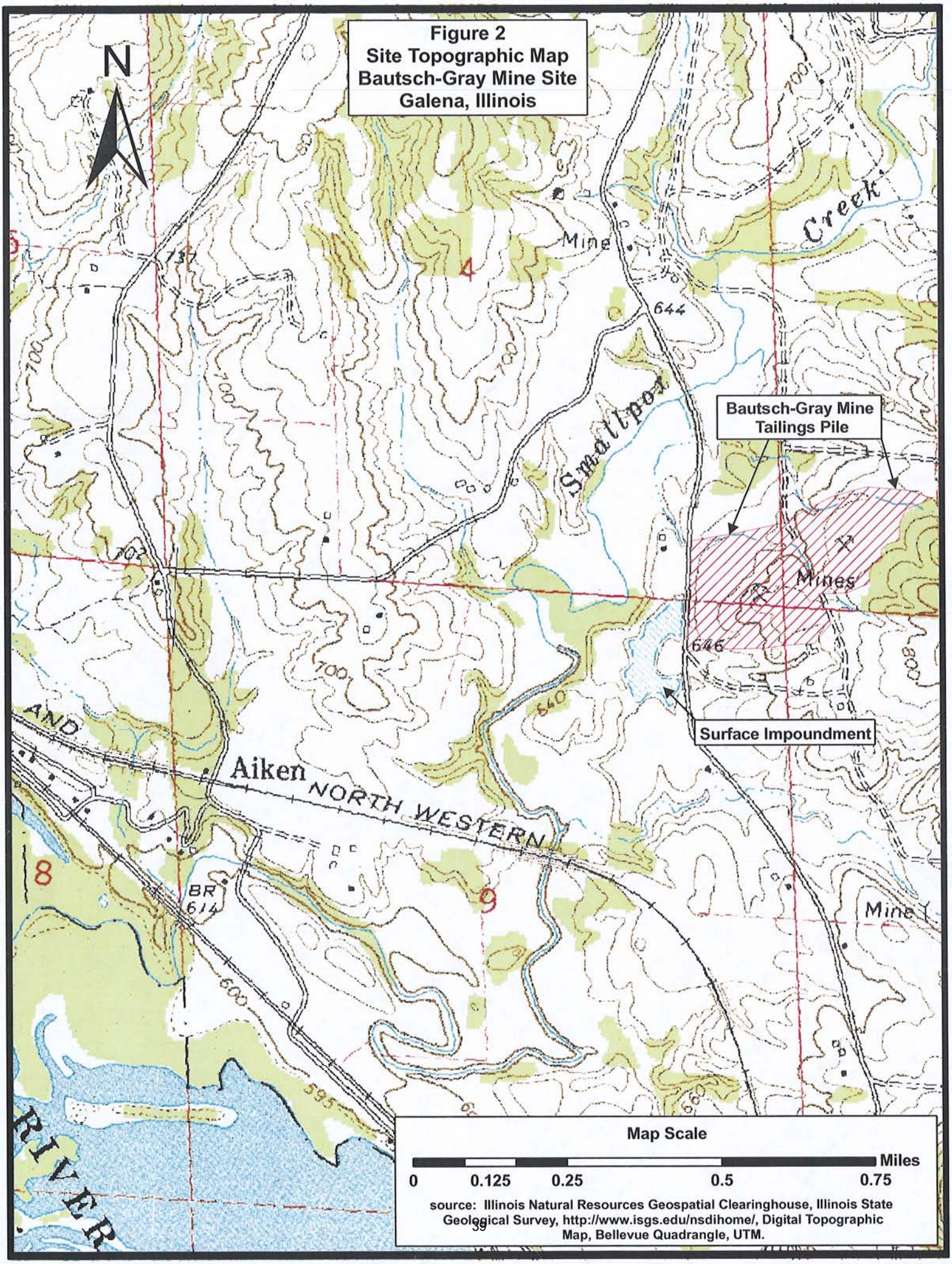
Figure 2
Site Topographic Map
Bautsch-Gray Mine Site
Galena, Illinois
N
Bautsch-Gray Mine
Tailings Pile
Surface Impoundment
Mine
Creek
Smallpox
Mines
Aiken
NORTH WESTERN
AND
RIVER
BR
614
Map Scale
Miles
0
0.125
0.25
0.5
0.75
source: Illinois Natural Resources Geospatial Clearinghouse, Illinois State Geological Survey, http://www.isgs.edu/nsdihome/, Digital Topographic Map, Bellevue Quadrangle, UTM.


Figure 3
Site Area Map
Bautsch-Gray Mine Site
Galena, Illinois
N
Bautsch-Gray Mine
Tailings Pile
Surface Impoundment
Blackjack Road
Map Scale
0
0.125
0.25
0.5
0.75
1
Miles
source: Illinois Natural Resources Geospatial Clearinghouse, Illinois State Geological Survey,
http://www.isgs.edu/nsdihome/, 2005 Digital Orthophoto Quarter Quadrangles, Jo Daviess County,
Bellevue NE Quadrangle, UTM.

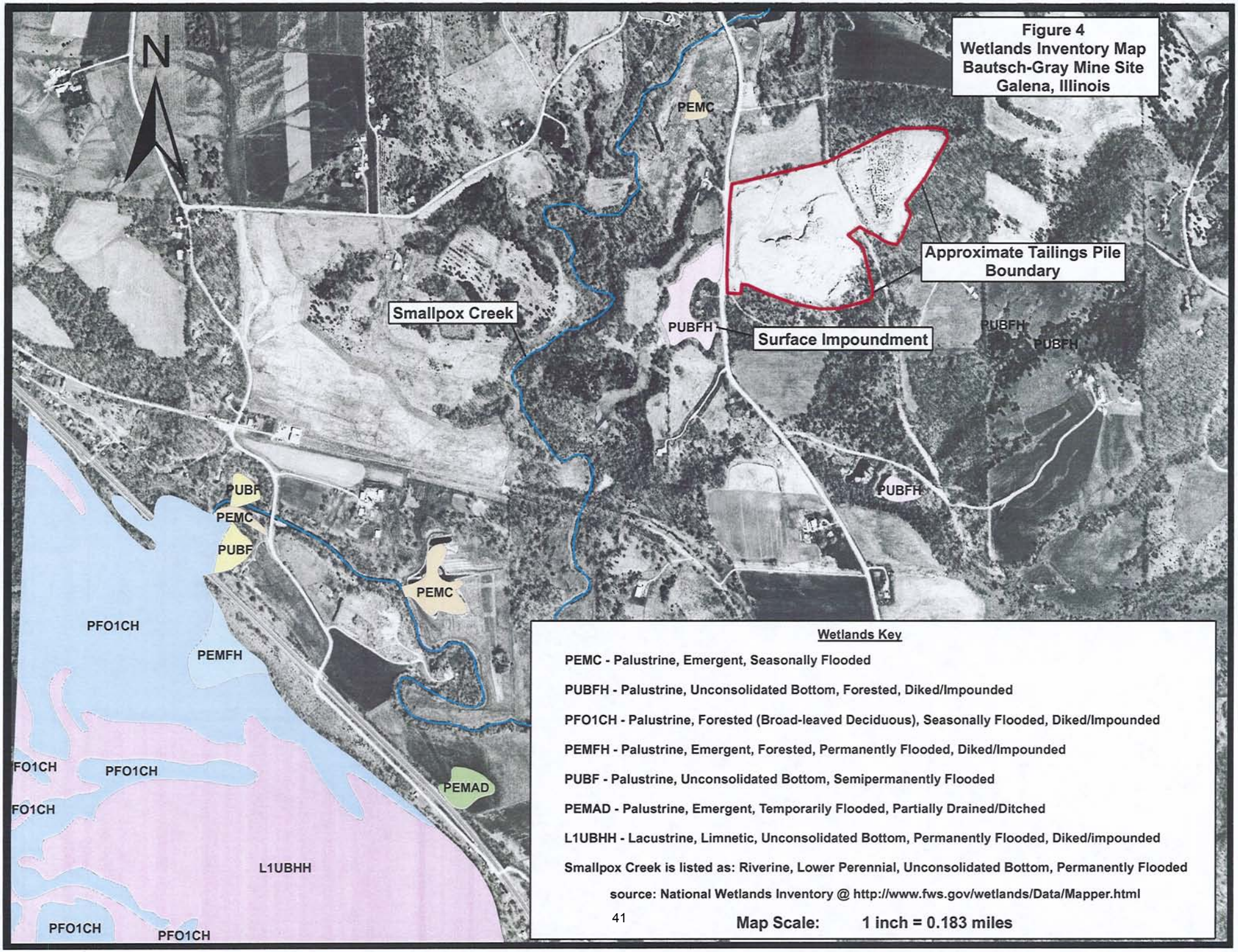
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Figure 4
Wetlands Inventory Map
Bautsch-Gray Mine Site
Galena, Illinois
PEMC
Approximate Tailings Pile Boundary
Smallpox Creek
PUBFH
Surface Impoundment
PUBFH
PUBFH
PUBF
PEMC
PUBF
PEMC
PUBFH
PFO1CH
PEMFH
FO1CH
PFO1CH
FO1CH
PEMAD
L1UBHH
PFO1CH
PFO1CH
Wetlands Key
PEMC - Palustrine, Emergent, Seasonally Flooded
PUBFH - Palustrine, Unconsolidated Bottom, Forested, Diked/Impounded
PFO1CH - Palustrine, Forested (Broad-leaved Deciduous), Seasonally Flooded, Diked/Impounded
PEMFH - Palustrine, Emergent, Forested, Permanently Flooded, Diked/Impounded
PUBF - Palustrine, Unconsolidated Bottom, Semipermanently Flooded
PEMAD - Palustrine, Emergent, Temporarily Flooded, Partially Drained/Ditched
L1UBHH - Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Diked/impounded
Smallpox Creek is listed as: Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded
source: National Wetlands Inventory @ http://www.fws.gov/wetlands/Data/Mapper.html
Map Scale: 1 inch = 0.183 miles

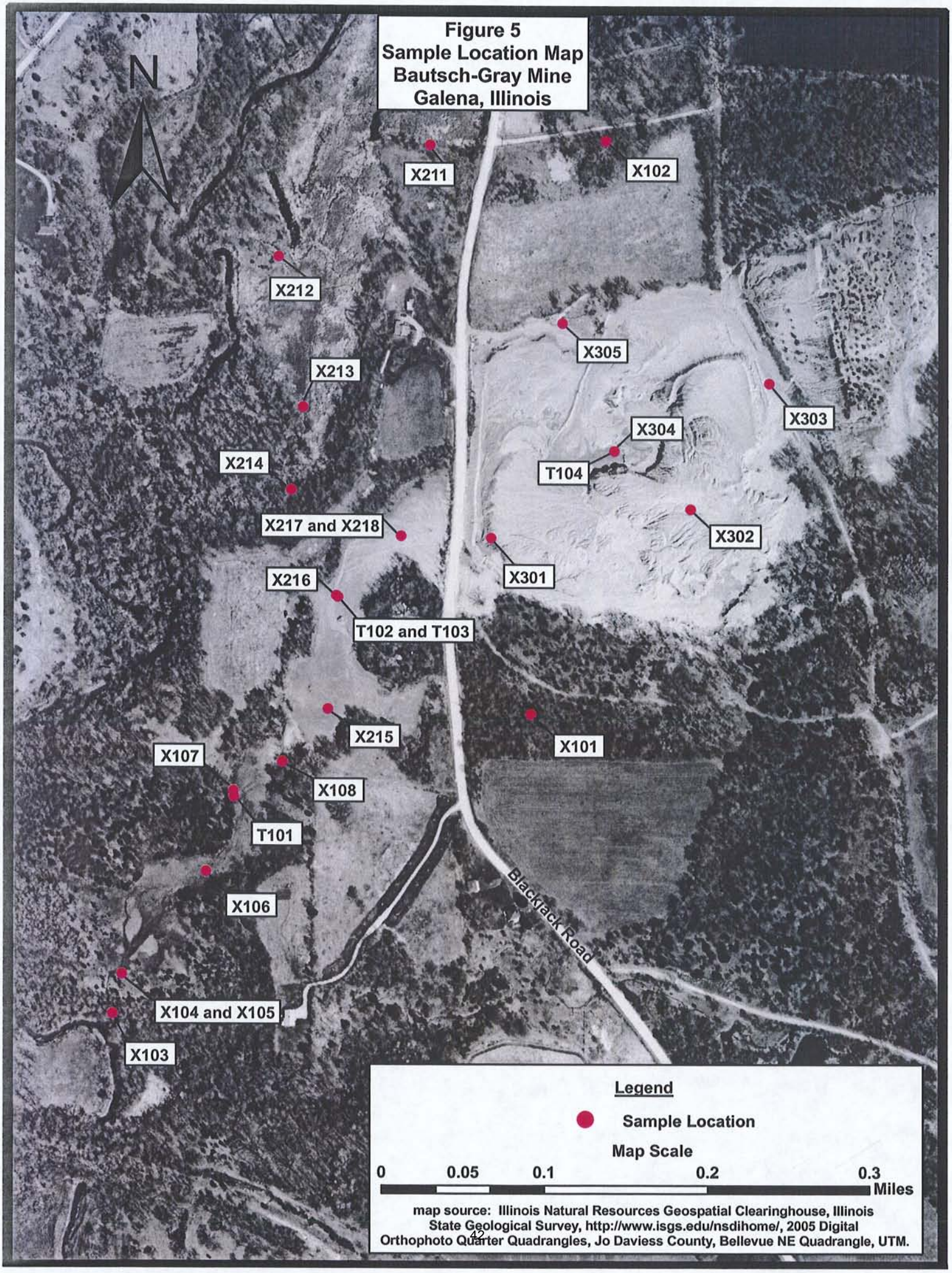


Figure 5
Sample Location Map
Bautsch-Gray Mine
Galena, Illinois
N
X211
X102
X212
X305
X213
X303
X304
X214
T104
X217 and X218
X302
X301
X216
T102 and T103
X215
X101
X107
X108
T101
X106
Blackjack Road
X104 and X105
X103
Legend
Sample Location
Map Scale
0
0.05
0.1
0.2
0.3
Miles
map source: Illinois Natural Resources Geospatial Clearinghouse, Illinois State Geological Survey, http://www.isgs.edu/nsdihome/, 2005 Digital Orthophoto Quarter Quadrangles, Jo Daviess County, Bellevue NE Quadrangle, UTM.

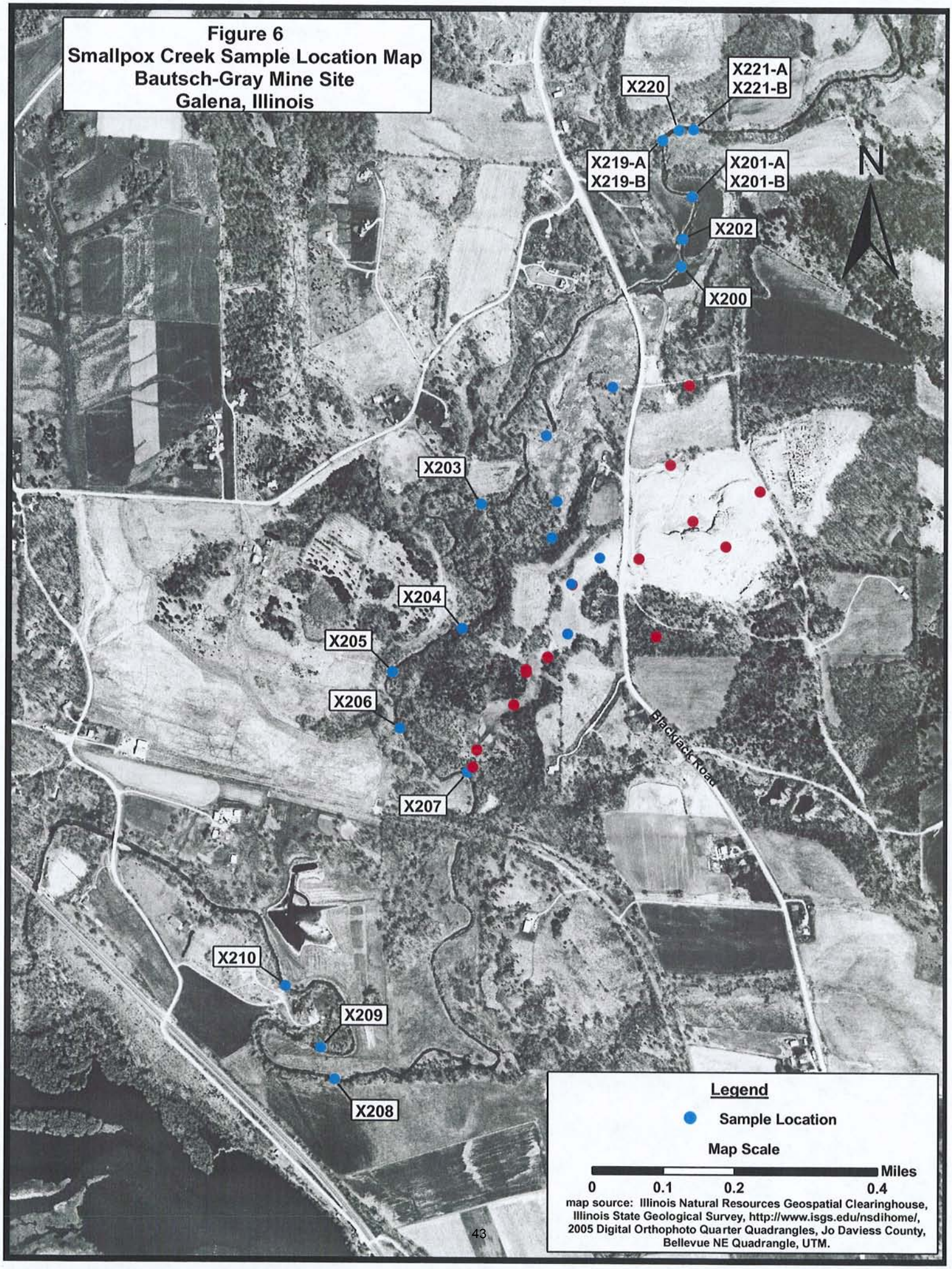


Figure 6
Smallpox Creek Sample Location Map
Bautsch-Gray Mine Site
Galena, Illinois
X220
X221-A
X221-B
X219-A
X219-B
X201-A
X201-B
X202
X200
N
X203
X204
X205
X206
X207
Blackjack Road
X210
X209
X208
Legend
Sample Location
Map Scale
Miles
0
0.1
0.2
0.4
map source: Illinois Natural Resources Geospatial Clearinghouse, Illinois State Geological Survey, http://www.isgs.edu/nsdihome/, 2005 Digital Orthophoto Quarter Quadrangles, Jo Daviess County, Bellevue NE Quadrangle, UTM.

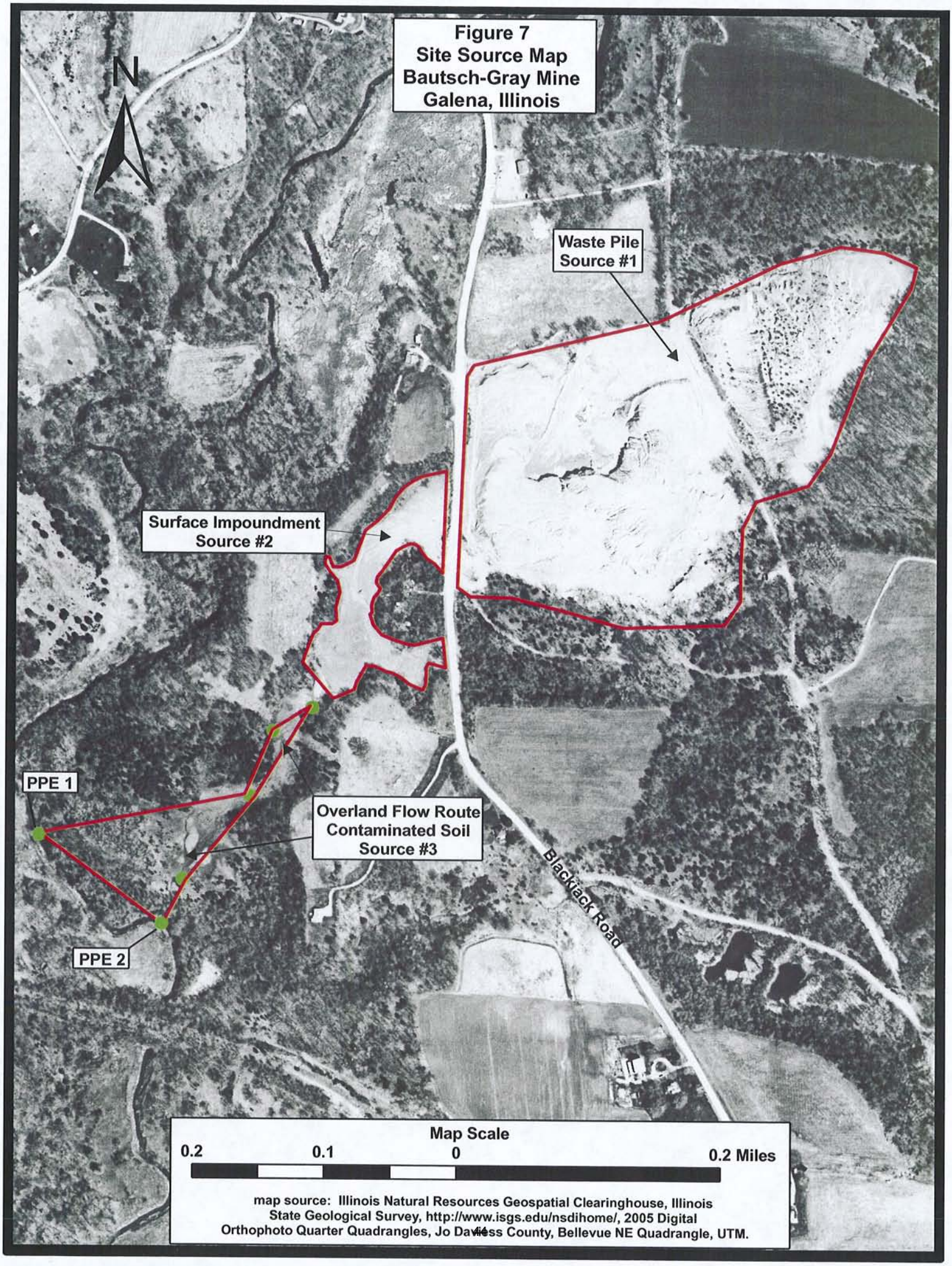


Figure 7
Site Source Map
Bautsch-Gray Mine
Galena, Illinois
N
Waste Pile
Source #1
Surface Impoundment
Source #2
PPE 1
Overland Flow Route
Contaminated Soil
Source #3
PPE 2
Blackjack Road
Map Scale
0.2
0.1
0
0.2 Miles
map source: Illinois Natural Resources Geospatial Clearinghouse, Illinois
State Geological Survey, http://www.isgs.edu/nsdihome/, 2005 Digital
Orthophoto Quarter Quadrangles, Jo Daviess County, Bellevue NE Quadrangle, UTM.

Table 1
Sample Descriptions
Smallpox Creek

Sample Number	Location	Time	Date Collected	Depth	Description
X219-A	Smallpox Creek, Sed 27	1050	Jan 20, 2010	0 - 6 inches	brown sandy silt with gravel, upgradient from Bautsch-Gray Mine and Blackjack Mine
X219-B	Smallpox Creek, Sed 27	1050	Jan 20, 2010	6 - 16 inches	brown/gray clayey silt, upgradient from Bautsch-Gray Mine and Blackjack Mine
X220	Smallpox Creek, Sed 28	1100	Jan 20, 2010	6 - 12 inches	gray/brown clayey silt, upgradient from Bautsch-Gray Mine and Blackjack Mine
X221-A	Smallpox Creek, Sed 29	1115	Jan 20, 2010	0 - 6 inches	gray/brown fine silty clay, upgradient from Bautsch-Gray Mine and Blackjack Mine
X221-B	Smallpox Creek, Sed 29	1115	Jan 20, 2010	6 - 12 inches	gray/brown clayey silt, upgradient from Bautsch-Gray Mine and Blackjack Mine
X200 Sed. Bkgnd.	Smallpox Creek, Sed 21	0945	Nov 18, 2009	6 - 12 inches	brown sand and gravel
X201-A Sed. Bkgnd.	Smallpox Creek, Sed 20	0920	Nov 18, 2009	0 - 6 inches	brown/gray silty clay with a small amt. of sand and gravel
X201-B Sed. Bkgnd.	Smallpox Creek, Sed 20	0920	Nov 18, 2009	6 - 12 inches	very stiff gray clay with silt
X202 Sed. Bkgnd.	Smallpox Creek, Sed 19	0900	Nov 18, 2009	0 - 6 inches	brown/gray sandy gravel with silt
X203	Smallpox Creek, Sed 14	1530	Nov 16, 2009	12-24 inches	brown/gray clayey silt
X204	Smallpox Creek, Sed 12	1430	Nov 16, 2009	0 - 6 inches	brown sand and gravel
X205	Smallpox Creek, Sed 11	1400	Nov 16, 2009	6 - 12 inches	brown sand and gravel with small amount of silt
X206	Smallpox Creek, Sed 10	1345	Nov 16, 2009	12 - 24 inches	mix of sandy gravel with brown/gray silt
X207	Smallpox Creek, Sed 9	1315	Nov 16, 2009	0 - 6 inches	gray/brown sand with small amount of silt
X208	Smallpox Creek, Sed 6	1130	Nov 16, 2009	0 - 6 inches	mix of sand with gray/brown silt
X209	Smallpox Creek, Sed 5	1100	Nov 16, 2009	6 - 12 inches	mix of sand and silty clay
X210	Smallpox Creek, Sed 4	1030	Nov 16, 2009	6 - 12 inches	brown/gray silty clay

* Location of each sediment sample can be found in Figure 5

* A photograph of each sample location can be found in Appendix C

Table 1 (con't)
Sample Descriptions
Wetland

Sample Number	Location	Time	Date Collected	Depth	Description
X211	wetland - NW of site	0900	Nov 17, 2009	0 - 2 inches	brown/gray silt (very organic)
X212	wetland - NW of site	0945	Nov 17, 2009	2 - 4 inches	brown silty clay (very organic)
X213	wetland - NW of site	1000	Nov 17, 2009	0 - 2 inches	dark brown/gray silt with organic material
X214	wetland - NW of site	1020	Nov 17, 2009	2 - 4 inches	dark brown/gray silt with organic material

* Location of each sample can be found in Figure 5

* A photograph of each sample location can be found in Appendix C

Sample Descriptions
Surface Impoundment

Sample Number	Location	Time	Date Collected	Depth	Description
X215	surface impoundment	1400	Nov 17, 2009	0 - 1 inch	gray/brown mine tailings
X216	surface impoundment	1415	Nov 17, 2009	0 - 1 inch	fine, pastey gray/brown mine tailings
X217 & X218	surface impoundment	1420	Nov 17, 2009	0 - 1 inch	gray/brown very fine mine tailings

* Location of each sample can be found in Figure 5

* A photograph of each sample location can be found in Appendix C

* X218 is a duplicate sample of X217 and collected for quality assurance purposes

Toxicity Characteristic Leaching Procedure (TCLP)
Sample Descriptions

Sample Number	Location	Time	Date Collected	Depth	Description
T101	overland flow route	1030	Nov 18, 2009	0 - 2 inches	brown/gray mine tailings
T102 & T103	surface impoundment	1045	Nov 18, 2009	0 - 2 inches	gray, very fine mine tailings
T104	waste pile	1200	Nov 18, 2009	0 - 2 inches	dark gray very fine mine tailings

* Location of each sample can be found in Figure 5

* A photograph of each sample location can be found in Appendix C

* T103 is a duplicate sample of T102 and collected for quality assurance purposes

Table 1 (con't)
Sample Descriptions
Background and Overland Flow Route

Sample Number	Location	Time	Date Collected	Depth	Description
X101 Soil Bkgnd.	South of Waste Pile	1400	Nov 18, 2009	0 - 2 inches	brown silty loam with med. brown sand
X102 Soil Bkgnd.	North of Waste Pile	1440	Nov 18, 2009	0 -2 inches	dark brown silty loam with sand
X103	Overland Flow	1250	Nov 17, 2009	0 - 1 inch	light brown/gray silt (very fine)
X104 & X105	Overland Flow	1320	Nov 17, 2009	0 -2 inches	light brown pastey silt with organic material
X106	Overland Flow	1330	Nov 17, 2009	0 - 2 inches	light brown/gray silt resembling mine tailings
X107	Overland Flow	1345	Nov 17, 2009	0 - 1 inch	fine gray/brown silt resembling mine tailings
X108	Overland Flow	1350	Nov 17, 2009	0 - 0.5 inch	gray/brown fine silt resembling mine tailings

* Location of each sample can be found in Figure 5

* A photograph of each sample location can be found in Appenix C

* X105 is a duplicate sample of X104 and collected for quality assurance purposes

Sample Descriptions
Waste Pile

Sample Number	Location	Time	Date Collected	Depth	Description
X301	Waste Pile	1530	Nov 17, 2009	0 - 2 inches	gray, clayey mine tailings
X302	Waste Pile	1600	Nov 17, 2009	0 - 6 inches	brown fine sand/silty mine tailings
X303	Waste Pile	1610	Nov 17, 2009	0 - 2 inches	fine dark gray/brown sandy mine tailings
X304	Waste Pile	1620	Nov 17, 2009	0 - 3 inches	brown/gray fine sandy/silty mine tailings
X305	Waste Pile	1630	Nov 17, 2009	0 - 2 inches	dark gray, fine mine tailings

* Location of each sample can be found in Figure 5

* A photograph of each sample location can be found in Appendix C

Table 2
Waste Pile Analytical Data
Bautsch-Gray Mine
Galena, Illinois

CLP Sample Number:	ME0027		ME0028		ME0006		ME0002		ME0003		ME0004		ME0005	
IEPA Sample Number:	X101		X102		X301		X302		X303		X304		X305	
Matrix:	Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Date Sampled:	11/18/2009		11/18/2009		11/17/2009		11/17/2009		11/17/2009		11/17/2009		11/17/2009	
Time Sampled:	1400		1440		1530		1600		1610		1620		1630	
Sample Depth:	0 - 2 inches Background		0 - 2 inches Background		0 - 2 inches		0 - 6 inches		0 - 2 inches		0 - 3 inches		0 - 2 inches	
ANALYTE	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ALUMINUM	5820		9880		3260	E	122	E	335	E	1020	E	1520	E
ANTIMONY	7.7	U,N	12.5	U,N	8.1	U,N	6.4	U,N	6.5	U,N	7.3	U,N	7.5	U,N
ARSENIC	3.6	E	5.6	E	26.1		15.3		30.2		41.4		68.0	
BARIUM	87.9		120		22.9	J,E	11.9	J,E	3.3	J,E	21.0	J,E	18.6	J,E
BERYLLIUM	0.64	U	0.25	J	0.50	J	0.065	J,E	0.075	J	0.20	J	0.30	J
CADMIUM	0.32	J,N,E	0.53	J,N,E	33.0		39.0		19.0		19.8		37.8	
CALCIUM	3760		17700		106000	E	165000	D,E	199000	D,E	141000	D,E	85600	E
CHROMIUM	8.6		16.7		6.7		0.77	J	1.3		2.5		2.5	
COBALT	5.3	J,N,E	6.5	J,N,E	17.3	E	2.9	J,E	3.8	JE	9.3	E	26.2	E
COPPER	5.8		22.4		265	E	66.2	E	5.8	E	36.2	E	44.1	E
IRON	8690	E	15000	E	29300	E	26100	E	28100	E	43900	E	79000	D,E
LEAD	35.2	E	44.5	E	1460	E	3610	E	3120	E	8970	E	15500	D,E
MAGNESIUM	1570		5600		36500	*,E	90200	D,*, E	77400	*,E	60600	*,E	37700	*,E
MANGANESE	491		392		826	*,E	1120	*,E	1160	*,E	904	*,E	913	*,E
MERCURY	0.13	U	0.21	U	0.10	J	0.11	U	0.052	J	0.088	J	0.13	
NICKEL	9.2	N,E	20.4	N,E	33.5	E	6.2	E	12.6	E	24.2	E	59.7	E
POTASSIUM	485	J	2570		1910	E	82.5	JE	228	J,E	606	J,E	1000	E
SELENIUM	4.5	U	0.97	J	0.59	J	3.8	U	3.8	U	0.64	J	0.62	J
SILVER	1.3	U	2.1	U	2.5		2.8		2.1		2.4		3.8	
SODIUM	16.1	J,N,E	29.9	J	89.9	J	176	J	186	J	111	J	66.6	J
THALLIUM	3.2	U	5.2	U	0.28	J	0.18	J	2.7	U	3.1	U	3.1	U
VANADIUM	16.5		29.9		4.7	J,E	0.75	J,E	1.7	J,E	2.4	J,E	2.7	J,E
ZINC	135		255		16100	D,*,N,E	15400	D,*,N,E	7880	D,*,N,E	8800	D,*,N,E	19000	D,*,N,E
CYANIDE	3.2	U	5.2	U	3.4	U,N	2.7	U,N	2.7	U,N	3.1	U,N	3.1	U,N

Data Qualifiers:

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

E - The result is an estimated quantity due to interferences occurring during the analysis of the serial dilution.

N - The spike recovery is not within control limits.

D - Indicates that the sample was diluted.

* - The duplicate sample is not within control llimits.

Table 3
Surface Impoundment Analytical Data
Bautsch-Gray Mine
Galena, Illinois

CLP Sample Number:	ME0027		ME0028		ME0023		ME0024		ME0025		ME0026	
IEPA Sample Number:	X101		X102		X215		X216		X217		X218	
Matrix:	Soil		Soil		Soil		Soil		Soil		Soil	
Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Date Sampled:	11/18/2009		11/18/2009		11/17/2009		11/17/2009		11/17/2009		11/17/2009	
Time Sampled:	1400		1440		1400		1415		1420		1420	
Sample Depth:	0 - 2 inches Background		0 - 2 inches Background		0 - 1 inch		0 - 1 inch		0 - 1 inch		0 -1 inch	
ANALYTE	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ALUMINUM	5820		9880		2010		2080		950		990	
ANTIMONY	7.7	U,N	12.5	U,N	7.2	U,N	7.8	U,N	7.6	U,N	7.5	U,N
ARSENIC	3.6	E	5.6	E	47.5	E	38.6	E	43.5	E	49.7	E
BARIUM	87.9		120		23.7	J	22.0	J	18.8	J	25.7	
BERYLLIUM	0.64	U	0.25	J	0.30	J	0.30	J	0.15	J	0.15	J
CADMIUM	0.32	J,N,E	0.53	J,N,E	19.6	N,E	18.8	N,E	15.7	N,E	16.9	N,E
CALCIUM	3760		17700		165000	D	136000	D	181000	D	152000	D
CHROMIUM	8.6		16.7		4.4		4.4		2.5		2.4	
COBALT	5.3	J,N,E	6.5	J,N,E	10.6	N,E	8.3	NE	7.9	N,E	8.5	N,E
COPPER	5.8		22.4		157		147		79.9		101	
IRON	8690	E	15000	E	50800	E	43500	E	48600	E	55800	E
LEAD	35.2	E	44.5	E	1890	E	2010	E	2020	E	2970	E
MAGNESIUM	1570		5600		66500		53300		73100		59500	
MANGANESE	491		392		1160		903		1140		967	
MERCURY	0.13	U	0.21	U	0.032	J	0.13	U	0.13	U	0.13	U
NICKEL	9.2	N,E	20.4	N,E	29.3	N,E	25.4	N,E	23.1	N,E	28.0	N,E
POTASSIUM	485	J	2570		962		1070		496	J	486	J
SELENIUM	4.5	U	0.97	J	4.2	U	4.6	U	4.4	U	4.4	U
SILVER	1.3	U	2.1	U	2.3		2.2		2.0		2.3	
SODIUM	16.1	J,N,E	29.9	J	134	J	115	J	139	J	95.1	J
THALLIUM	3.2	U	5.2	U	3.0	U	3.3	U	3.2	U	3.1	U
VANADIUM	16.5		29.9		4.6	J	4.6	J	2.9	J	3.1	J
ZINC	135		255		9790	D	9160	D	7610	D	9190	D
CYANIDE	3.2	U	5.2	U	3.0	U	3.3	U	3.2	U	3.1	U

Data Qualifiers:

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

E - The result is an estimated quantity due to interferences occurring during the analysis of the serial dilution.

N - The spike recovery is not within control limits.

D - Indicates that the sample was diluted.

* - The duplicate sample is not within control llimits.

Table 4
Overland Flow Analytical Data
Bautsch-Gray Mine
Galena, Illinois

CLP Sample Number:	ME0027		ME0028		ME0029		ME0030		ME0031		ME0032		ME0033		ME0034	
IEPA Sample Number:	X101		X102		X103		X104		X105		X106		X107		X108	
Matrix:	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Date Sampled:	11/18/2009		11/18/2009		11/17/2009		11/17/2009		11/17/2009		11/17/2009		11/17/2009		11/17/2009	
Time Sampled:	1400		1440		1250		1320		1320		1330		1345		1350	
Sample Depth:	0 - 2 inches Background		0 - 2 inches Background		0 - 1 inch		0 - 2 inches		0 - 2 inches		0 - 2 inches		0 - 1 inch		0 - 0.5 inch	
ANALYTE	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ALUMINUM	5820		9880		4970		2930		3390		1950		1190		519	
ANTIMONY	7.7	U,N	12.5	U,N	9.3	UJ	8.6	U,N	8.7	U,N	7.7	U,N	7.3	U,N	7.7	U,N
ARSENIC	3.6	E	5.6	E	37.5		41.8	E	56.8	E	38.3	E	42.0	E	91.2	E
BARIUM	87.9		120		46.2		35.8		41.6		23.9	J	17.5	J	14.6	J
BERYLLIUM	0.64	U	0.25	J	0.44	UJ	0.28	J	0.37	J	0.22	J	0.16	J	0.12	J
CADMIUM	0.32	J,N,E	0.53	J,N,E	25.6	J	20.8	N,E	25.6	N,E	17.3	N,E	14.2	N,E	12.2	N,E
CALCIUM	3760		17700		98000		114000		167000	D	129000	D	144000	D	142000	D
CHROMIUM	8.6		16.7		9.0		5.7		6.5		4.1		2.8		1.1	J
COBALT	5.3	J,N,E	6.5	J,N,E	11.5	J	10.4	N,E	12.2	N,E	8.5	N,E	9.8	N,E	10.6	N,E
COPPER	5.8		22.4		199		154		201		133		96.7		80.9	
IRON	8690	E	15000	E	41900		47800	E	61300	E	45200	E	46900	E	118000	D,E
LEAD	35.2	E	44.5	E	2720		2560	E	3300	E	2100	E	1690	E	2440	E
MAGNESIUM	1570		5600		40900		48700		62000		51100		60600		62400	
MANGANESE	491		392		953		962		1180		923		1040		995	
MERCURY	0.13	U	0.21	U	0.061	J	0.14	U	0.15	U	0.13	U	0.038	J	0.13	U
NICKEL	9.2	N,E	20.4	N,E	32.3	J	29.8	N,E	37.7	N,E	24.8	N,E	23.6	N,E	44.7	N,E
POTASSIUM	485	J	2570		1750		1130		1410		915		546	J	216	J
SELENIUM	4.5	U	0.97	J	0.65	J	0.76	J	5.1	U	4.5	U	4.3	U	4.5	U
SILVER	1.3	U	2.1	U	2.5		2.4		2.9		2.2		2.0		2.9	
SODIUM	16.1	J,N,E	29.9	J	88.1	UJ	95.7	J	124	J	87.4	J	120	J	118	J
THALLIUM	3.2	U	5.2	U	3.9	U	3.6	U	3.6	U	3.2	U	3.0	U	3.2	U
VANADIUM	16.5		29.9		10.0		6.6	J	7.5		4.3	J	3.5	J	2.6	J
ZINC	135		255		12500		10700	D	12700	D	8720	D	7650	D	4430	
CYANIDE	3.2	U	5.2	U	0.33	U	3.6	U	3.6	U	3.2	U	3.0	U	3.2	U

Data Qualifiers:

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

E - The result is an estimated quantity due to interferences occurring during the analysis of the serial dilution.

N - The spike recovery is not within control limits.

D - Indicates that the sample was diluted.

* - The duplicate sample is not within control llimits.

Table 5
Smallpox Creek Analtyical Data
Bautsch-Gray Mine
Galena, Illinois

CLP Sample Number:	ME00Y1		ME00Y2		ME00Y3		ME00Y4		ME00Y5		ME0007		ME0008		ME0009		ME0010	
IEPA Sample Number:	X219-A		X219-B		X220		X221-A		X221-B		X200		X201A		X201B		X202	
Matrix:	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Date Sampled:	1/20/2010		1/20/2010		1/20/2010		1/20/2010		1/20/2010		11/18/2009		11/18/2009		11/18/2009		11/18/2009	
Time Sampled:	1050		1050		1100		1115		1115		0945		0920		0920		0900	
Sample Depth:	0 - 6 inches *		6 - 16 inches *		6 - 12 inches *		0 - 6 inches *		6 - 12 inches *		6 - 12 inches Background		0 - 6 inches Background		6 - 12 inches Background		0 - 6 inches Background	
ANALYTE	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ALUMINUM	9650		7870		7070		9630		8500		6260	J	7770	J	7680	J	6030	J
ANTIMONY	8.6	UJ	8.8	UJ	8.1	UJ	8.1	UJ	8.3	UJ	11.4	UJ	8.5	UJ	8.7	UJ	16.4	UJ
ARSENIC	6.5		5.2		2.9		3.8		4.4		20.8		5.1		6.0		24.8	
BARIUM	126	J	130	J	98.6	J	118	J	115	J	112	J	86.1	J	86.3	J	91.0	J
BERYLLIUM	0.69	J+	0.53	J+	0.50	J+	0.65	J+	0.69	U	0.95	U	0.71	U	0.73	U	1.4	U
CADMIUM	0.55	J+	0.46	J	0.42	J	0.39	J	0.69	UJ	5.8		6.9		0.73	UJ	16.7	
CALCIUM	59400		93600		49100		59500		70100		124000	J	57000	J	54400	J	286000	J
CHROMIUM	18.7		14.6		11.5		17.1		15.7		14.7		14.8		14.7		12.1	
COBALT	13.9		11.8		7.6		13.3		15.0		13.1	J	7.1	J	8.7	J	13.7	UJ
COPPER	18.3		14.1		12.1		18.2		16.7		9.5	J-	13.8	J-	11.3	J-	6.1	J-
IRON	20000		13900		9920		14900		13500		36800	J	12800	J	14500	J	46300	J
LEAD	14.6	J	11.0	J	14.7	J	11.9	J	12.2	J	113	J	13.6	J	14.1	J	213	J
MAGNESIUM	22400		17800		21600		18300		17300		47300	J	25200	J	24600	J	106000	J
MANGANESE	1120		628		383		470		390		1680	J	431	J	643	J	2870	J
MERCURY	0.14	U	0.16	U	0.14	U	0.13	U	0.14	U	0.10	J	0.047	J	0.039	J	0.27	U
NICKEL	24.9		19.7		15.2		24.9		24.0		21.7	J	16.4	J	18.8	J	20.1	J
POTASSIUM	1820		1380		1030		1640		1390		1090	J	1140	J	1210	J	958	J
SELENIUM	5.0	UJ	5.1	UJ	4.7	UJ	4.8	UJ	0.80	J+	6.6	U	5.0	U	5.1	U	9.6	U
SILVER	1.4	U	1.5	U	1.4	U	1.4	U	1.4	U	1.2	J	0.68	J	1.5	U	1.7	J
SODIUM	714	U	732	U	676	U	679	U	692	U	947	U	709	U	726	U	1370	U
THALLIUM	3.2	J	1.7	J	0.80	J	2.0	J	2.1	J	4.7	UJ	3.5	UJ	3.6	UJ	6.8	UJ
VANADIUM	32.2		22.8		20.0		28.3		25.6		24.2	J	23.1	J	23.0	J	21.4	J
ZINC	72.3	J	71.7	J	68.9	J	64.5	J	73.0	J	1570	J+	3760	J+	151	J+	6490	J+
CYANIDE	3.5	U	0.32	J	3.4	U	3.5	U	3.5	U	4.7	UJ	3.5	UJ	3.6	UJ	6.8	UJ

Data Qualifiers:

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- The result is an estimated quantity, but the result may be biased low.

J+ The result is an estimated quantity, but the result may be biased high.

UJ The analyte was analyzed for, but not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

* Samples X219A, X219B, X220, X221A, and X221 B were collected upgradient from Bautsch-Gray Mine and Blackjack Mine

Table 5 (con't)
Smallpox Creek Analytical Data
Bautsch-Gray Mine
Galena, Illinois

CLP Sample Number:	ME0011		ME0012		ME0013		ME0014		ME0015		ME0016		ME0017		ME0018	
IEPA Sample Number:	X203		X204		X205		X206		X207		X208		X209		X210	
Matrix:	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Date Sampled:	11/16/2009		11/16/2009		11/16/2009		11/16/2009		11/16/2009		11/16/2009		11/16/2009		11/16/2009	
Time Sampled:	1530		1430		1400		1345		1315		1130		1100		1030	
Sample Depth:	12 - 24 inches		0 - 6 inches		6 - 12 inches		12 - 24 inches		0 - 6 inches		0 - 6 inches		6 - 12 inches		6 - 12 inches	
ANALYTE	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ALUMINUM	5760	E	1450	E	838	E	4740	E	4070	E	4810	E	3820	E	3060	E
ANTIMONY	7.9	U,N	7.6	U,N	6.6	U,N	9.0	U,N	8.2	U,N	9.1	U,N	6.9	U,N	8.5	U,N
ARSENIC	9.8		11.1		11.1		11.9		20.6		5.1		6.5		33.9	
BARIUM	102	E	27.8	E	20.0	J,E	85.5	E	62.8	E	89.7	E	59.3	E	86.7	E
BERYLLIUM	0.066	J	0.057	J	0.069	J	0.75	U	0.68	U	0.76	U	0.57	U	0.10	J
CADMIUM	12.6		11.9		10.8		12.5		10.6		3.5		5.9		24.9	
CALCIUM	34900	E	180000	D,E	136000	D,E	85100	E	61700	E	46100	E	39700	E	121000	D,E
CHROMIUM	9.8		3.4		2.4		8.4		6.4		8.1		6.6		6.2	
COBALT	5.6	J,E	3.2	J,E	2.8	J,E	7.1	J,E	7.4	E	5.9	J,E	4.8	J,E	11.6	E
COPPER	5.9	E	1.9	J,E	1.1	J,E	7.0	E	31.1	E	6.8	E	7.4	E	380	E
IRON	20500	E	22100	E	16900	E	23200	E	26600	E	12800	E	13200	E	52800	E
LEAD	34.0	E	101	E	95.1	E	986	E	533	E	127	E	357	E	2070	E
MAGNESIUM	17900	*,E	63400	*,E	59200	*,E	34400	*,E	29600	*,E	22000	*,J	20800	*,E	44000	*,E
MANGANESE	875	*,E	2280	*,E	1740	*,E	1310	*,E	1040	*,E	921	*,J	713	*,E	1360	*,E
MERCURY	0.13	U	0.045	J	0.057	J	0.10	J	0.076	J	0.059	J	0.11	U	0.26	
NICKEL	10.2	E	6.1	E	5.1	E	15.0	E	14.1	E	10.5	E	12.2	E	30.9	E
POTASSIUM	563	J,E	282	J,E	186	J,E	646	J,E	577	J,E	602	J,E	450	J,E	679	J,E
SELENIUM	0.91	J	4.4	U	3.8	U	0.51	J	4.8	U	0.77	J	4.0	U	0.84	J
SILVER	1.3		1.1	J	1.1		1.1	J	1.3	J	1.5	U	0.59	J	2.7	
SODIUM	70.9	J	173	J	143	J,E	112	J	97.6	J	75.5	J	67.9	J	73.5	J
THALLIUM	3.3	U	3.2	U	2.7	U	3.8	U	3.4	U	3.8	U	2.9	U	3.6	U
VANADIUM	13.4	E	5.7	J,E	3.9	J,E	14.2	E	11.0	E	13.6	E	11.3	E	7.9	E
ZINC	4680	*,N,E	4650	*,N,E	4270	*,N,E	5070	*,N,E	4320	*,N,E	1530	*,N,E	2540	*,N,E	9490	D,*,N,E
CYANIDE	3.3	U,N	3.2	U,N	2.7	U,N	3.8	U,N	3.4	U,N	3.8	U,N	2.9	U,N	3.6	UJ

Data Qualifiers:

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

E - The result is an estimated quantity due to interferences occurring during the analysis of the serial dilution.

N - The spike recovery is not within control limits.

D - Indicates that the sample was diluted.

* - The duplicate sample is not within control llimits.

Table 6
Wetland Analytical Data
Bautsch-Gray Mine
Galena, Illinois

CLP Sample Number:	ME0027		ME0028		ME0019		ME0020		ME0021		ME0022	
IEPA Sample Number:	X101		X102		X211		X212		X213		X214	
Matrix:	Soil		Soil		Soil		Soil		Soil		Soil	
Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Date Sampled:	11/18/2009		11/18/2009		11/17/2009		11/17/2009		11/17/2009		11/17/2009	
Time Sampled:	1400		1440		0900		0945		1000		1045	
Sample Depth:	0 - 2 inches Background		0 - 2 inches Background		0 - 2 inches		2 - 4 inches		0 - 2 inches		2 - 4 inches	
ANALYTE	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ALUMINUM	5820		9880		7030	E	5370	E	5340	E	6240	
ANTIMONY	7.7	U,N	12.5	U,N	19.0	U,N	10.7	U,N	8.3	U,N	9.2	U,N
ARSENIC	3.6	E	5.6	E	6.4		2.9		5.3		5.5	E
BARIUM	87.9		120		53.6	J,E	78.6	E	88.7	E	92.2	
BERYLLIUM	0.64	U	0.25	J	1.6	U	0.89	U	0.70	U	0.068	J
CADMIUM	0.32	J,N,E	0.53	J,N,E	1.4	J	3.0		0.93		1.1	N,E
CALCIUM	3760		17700		12300	E	16800	E	19600	E	29900	
CHROMIUM	8.6		16.7		10.3		8.4		8.3		10.1	
COBALT	5.3	J,N,E	6.5	J,N,E	11.8	J,E	5.9	J,E	6.6	J,E	6.1	J,N,E
COPPER	5.8		22.4		13.6	E	9.2	E	7.0	E	12.9	
IRON	8690	E	15000	E	17700	E	9060	E	12800	E	20600	E
LEAD	35.2	E	44.5	E	61.6	E	36.1	E	67.3	E	66.4	E
MAGNESIUM	1570		5600		5390	*,E	8530	*,E	10700	*,E	9520	
MANGANESE	491		392		169	*,E	592	*,E	556	*,E	2080	
MERCURY	0.13	U	0.21	U	0.13	J	0.058	J	0.14	U	0.15	U
NICKEL	9.2	N,E	20.4	N,E	22.0	E	11.1	E	12.1	E	11.2	N,E
POTASSIUM	485	J	2570		878	J,E	890	J,E	668	J,E	726	J
SELENIUM	4.5	U	0.97	J	1.6	J	0.66	J	0.92	J	5.4	U
SILVER	1.3	U	2.1	U	3.2	U	1.8	U	1.4	U	0.72	J
SODIUM	16.1	J,N,E	29.9	J	117	J	48.8	J	48.7	J	56.0	J
THALLIUM	3.2	U	5.2	U	7.9	U	4.5	U	3.5	U	3.8	U
VANADIUM	16.5		29.9		17.3	E	13.2	E	13.8	E	15.8	
ZINC	135		255		5650	*,N,E	1240	*,N,E	425	*,N,E	1010	
CYANIDE	3.2	U	5.2	U	7.9	U,N	4.5	U,N	3.5	U,N	3.8	U

Data Qualifiers:

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

E - The result is an estimated quantity due to interferences occurring during the analysis of the serial dilution.

N - The spike recovery is not within control limits.

D - Indicates that the sample was diluted.

* - The duplicate sample is not within control llimits.

Table 7
Toxicity Characteristic Leaching Procedure (TCLP)
Sample Results
Bautsch-Gray Mine
Galena, Illinois

Sample Number:	T101	T102	T103	T104	Regulatory Level
Date Sampled:	Nov. 18, 2009	Nov. 18, 2009	Nov. 18, 2009	Nov. 18, 2009	
Time Sampled:	1030	1045	1045	1200	
Sample Depth:	0 - 2 inches	0 - 2 inches	0 - 2 inches	0 - 2 inches	
Arsenic	U	0.076	U	U	5
Barium	0.183	0.135	0.144	0.394	100
Cadmium	0.621	0.443	0.435	0.458	1
Chromium	U	0.0152	0.116	0.115	5
Lead	33.6	40.7	39.3	147	5
Selenium	0.177	0.166	0.138	0.133	5
Silver	U	U	U	U	5

All values reported in mg/l (ppm)

Sample T103 is a field duplicate of T102

U - denotes the compound was undetected

The location of each TCLP sample is illustrated in Figure 5

Highlighted areas note that TCLP values have exceeded regulatory levels according to: Title 35, Subtitle G Chapter 1, Subchapter C, Section 721.124 of the Environmental Regulations for the State of Illinois

Table 8
XRF Data
Expanded Site Inspection
Bautsch-Gray Mine Site
Galena, Illinois

Location	XRF Number	Sample No. (if sampled)	Pb (lead)	Zn (zinc)	Cr (chromium)	Mn (manganese)	Fe (iron)	Ni (nickel)	Cu (copper)	As (arsenic)	Cd (cadmium)
wetland	3		94	1441	<LOD	365	6932	<LOD	<LOD	<LOD	<LOD
wetland	4	X211	149	3441	<LOD	250	14795	<LOD	<LOD	<LOD	<LOD
wetland	5		58	907	<LOD	213	7399	<LOD	<LOD	<LOD	<LOD
wetland	6		<LOD	74	<LOD	131	10114	<LOD	<LOD	<LOD	<LOD
wetland	7		<LOD	33	<LOD	870	11379	<LOD	<LOD	<LOD	<LOD
wetland	8		17	94	<LOD	215	8804	<LOD	<LOD	<LOD	<LOD
wetland	9		35	205	<LOD	511	9350	<LOD	<LOD	<LOD	<LOD
wetland	10		20	106	<LOD	283	7912	<LOD	<LOD	<LOD	<LOD
wetland	11		36	147	<LOD	332	8882	<LOD	<LOD	<LOD	<LOD
wetland	12	X212	23	205	<LOD	163	7384	<LOD	<LOD	<LOD	<LOD
wetland	13		25	88	<LOD	129	7631	<LOD	<LOD	<LOD	<LOD
wetland	14		15	89	<LOD	138	6660	<LOD	<LOD	<LOD	<LOD
wetland	15	X213	45	609	<LOD	1189	28154	<LOD	<LOD	<LOD	<LOD
wetland	16		51	525	<LOD	1019	15364	<LOD	<LOD	<LOD	<LOD
wetland	17	X214	52	696	<LOD	1314	15464	<LOD	<LOD	<LOD	<LOD
wetland	18		<LOD	55	<LOD	733	5480	<LOD	<LOD	<LOD	<LOD
overland flow	20	X103	1927	7938	<LOD	322	26533	<LOD	85	<LOD	<LOD
overland flow	21	X104/X105	2086	8599	<LOD	425	38061	<LOD	71	<LOD	<LOD
overland flow	22	X106	1761	7503	<LOD	360	34609	<LOD	83	<LOD	<LOD
overland flow	23		705	2538	<LOD	671	24953	<LOD	<LOD	<LOD	<LOD
overland flow	24		715	2527	<LOD	614	22590	<LOD	<LOD	<LOD	<LOD
overland flow	25		741	2736	<LOD	440	30858	<LOD	<LOD	<LOD	<LOD
overland flow	26	X107	1516	6387	<LOD	517	34028	<LOD	94	<LOD	<LOD
overland flow	27		1300	4388	<LOD	531	38127	<LOD	<LOD	<LOD	<LOD
overland flow	28	X108	2362	5208	<LOD	<LOD	110662	<LOD	<LOD	<LOD	<LOD
overland flow	29		1412	5300	<LOD	476	30081	<LOD	127	<LOD	<LOD
surface impoundment	32	X215	1894	9008	<LOD	494	37570	<LOD	99	<LOD	<LOD
surface impoundment	33		1076	3816	<LOD	617	51854	<LOD	<LOD	<LOD	<LOD
surface impoundment	34		1435	5406	<LOD	586	53748	<LOD	90	<LOD	<LOD
surface impoundment	35		463	2319	<LOD	695	21099	<LOD	<LOD	<LOD	<LOD
surface impoundment	36		964	3923	<LOD	806	40369	<LOD	<LOD	<LOD	<LOD
surface impoundment	37	X216	2009	8143	<LOD	449	35243	<LOD	152	<LOD	<LOD
surface impoundment	38	X217/X218	2166	7636	<LOD	503	31488	<LOD	65	<LOD	<LOD
waste pile	63	X301	4168	8802	<LOD	505	29332	<LOD	174	<LOD	<LOD
waste pile	64		851	11667	<LOD	1765	52719	<LOD	<LOD	85	<LOD
waste pile	65		1397	4156	<LOD	696	21719	<LOD	<LOD	<LOD	<LOD
waste pile	66		1172	3101	<LOD	441	16591	<LOD	64	<LOD	<LOD
waste pile	67	X302	2064	2448	<LOD	1014	16254	<LOD	64	<LOD	<LOD
waste pile	68	X303	3789	8539	<LOD	753	22913	<LOD	<LOD	<LOD	<LOD
waste pile	69	X304	8067	9704	<LOD	729	53480	<LOD	<LOD	<LOD	<LOD
waste pile	70	X305	5280	13978	<LOD	1120	87474	<LOD	88	<LOD	<LOD

* all results are reported in parts per million (ppm)

<LOD - indicates Below the Detection of the XRF

Table 8 (con't)
XRF Data
Expanded Site Inspection
Bautsch-Gray Mine Site
Galena, Illinois

Location	XRF Number	Sample No. (if sampled)	Pb (lead)	Zn (zinc)	Cr (chromium)	Mn (manganese)	Fe (iron)	Ni (nickel)	Cu (copper)	As (arsenic)	Cd (cadmium)
miscellaneous	7		250	2337	<LOD	607	15443	<LOD	<LOD	<LOD	<LOD
miscellaneous	8		114	1416	<LOD	281	10979	<LOD	<LOD	<LOD	<LOD
miscellaneous	9		20	316	<LOD	192	14178	<LOD	<LOD	<LOD	<LOD
miscellaneous	10		267	1810	<LOD	368	13022	<LOD	<LOD	<LOD	<LOD
miscellaneous	11		151	1223	<LOD	480	11712	<LOD	<LOD	<LOD	<LOD
miscellaneous	12		306	1639	<LOD	219	10380	<LOD	<LOD	<LOD	<LOD
miscellaneous	13		345	2185	<LOD	515	16854	<LOD	<LOD	<LOD	<LOD
miscellaneous	14		163	1797	<LOD	463	13492	<LOD	<LOD	<LOD	<LOD
miscellaneous	15		370	8567	<LOD	634	23309	<LOD	<LOD	<LOD	<LOD
miscellaneous	16		384	2190	<LOD	353	14944	<LOD	<LOD	<LOD	<LOD
miscellaneous	17		284	1695	<LOD	451	12780	<LOD	<LOD	<LOD	<LOD
miscellaneous	18		259	1751	<LOD	423	14754	<LOD	<LOD	<LOD	<LOD
miscellaneous	19		179	1554	<LOD	283	12469	<LOD	<LOD	<LOD	<LOD
miscellaneous	20		386	2077	<LOD	312	11539	<LOD	<LOD	<LOD	<LOD
miscellaneous	21		68	617	<LOD	727	9718	<LOD	<LOD	<LOD	<LOD
miscellaneous	22		50	437	<LOD	820	9451	<LOD	<LOD	<LOD	<LOD
miscellaneous	23		24	251	<LOD	177	5420	<LOD	<LOD	<LOD	<LOD
miscellaneous	24		105	685	<LOD	272	10303	<LOD	<LOD	<LOD	<LOD
miscellaneous	25		101	812	<LOD	255	9702	<LOD	<LOD	<LOD	<LOD
miscellaneous	26		285	6844	<LOD	560	20427	<LOD	<LOD	<LOD	<LOD
miscellaneous	27		438	2691	<LOD	354	18115	<LOD	<LOD	<LOD	<LOD
miscellaneous	28		15	118	<LOD	<LOD	12207	<LOD	<LOD	<LOD	<LOD
miscellaneous	30		460	3822	<LOD	483	18009	<LOD	<LOD	<LOD	<LOD
soil background (S)	32		83	297	<LOD	194	4850	<LOD	<LOD	<LOD	<LOD
soil background (S)	33		226	481	<LOD	373	9364	<LOD	<LOD	<LOD	<LOD
soil background (S)	34		209	409	<LOD	322	8028	<LOD	<LOD	<LOD	<LOD
soil background (S)	35		38	103	<LOD	257	6276	<LOD	<LOD	<LOD	<LOD
soil background (S)	36	X101	15	74	<LOD	305	8710	<LOD	<LOD	<LOD	<LOD
soil background (N)	37		41	162	<LOD	195	10113	<LOD	<LOD	<LOD	<LOD
soil background (N)	38		37	196	<LOD	181	12689	<LOD	<LOD	<LOD	<LOD
soil background (N)	39		50	241	<LOD	136	16511	<LOD	<LOD	<LOD	<LOD
soil background (N)	40	X102	20	141	<LOD	135	12023	<LOD	<LOD	<LOD	<LOD
soil background (N)	41		35	178	<LOD	<LOD	11698	<LOD	<LOD	<LOD	<LOD

* all results are reported in parts per million (ppm)

<LOD - indicates Below the Detection of the XRF

Table 8 (con't)
XRF Data
Expanded Site Inspection
Bautsch-Gray Mine Site
Galena, Illinois

Location	XRF Number	Sample No (if sampled)	Pb (lead)	Zn (zinc)	Cr (chromium)	Mn (manganese)	Fe (iron)	Ni (nickel)	Cu (copper)	As (arsenic)	Cd (cadmium)
Sediment 1	3		114	426	<LOD	812	22242	<LOD	<LOD	<LOD	<LOD
Sediment 1	4		26	219	<LOD	500	18422	<LOD	<LOD	<LOD	<LOD
Sediment 2	5		87	841	<LOD	255	9939	<LOD	<LOD	<LOD	<LOD
Sediment 2	6		72	483	<LOD	477	13784	<LOD	<LOD	<LOD	<LOD
Sediment 2	8		83	505	<LOD	255	10749	<LOD	<LOD	<LOD	<LOD
Sediment 3	9		46	854	<LOD	450	11192	<LOD	<LOD	<LOD	<LOD
Sediment 3	10		115	652	<LOD	320	14164	<LOD	<LOD	<LOD	<LOD
Sediment 3	11		86	591	<LOD	350	11771	<LOD	<LOD	<LOD	<LOD
Sediment 4	12		97	674	<LOD	331	12156	<LOD	<LOD	<LOD	<LOD
Sediment 4	13	X210	1594	6733	<LOD	1092	52000	<LOD	216	<LOD	<LOD
Sediment 4	14		39	196	<LOD	169	15195	<LOD	<LOD	<LOD	<LOD
Sediment 5	15		54	600	<LOD	368	13421	<LOD	<LOD	<LOD	<LOD
Sediment 5	16	X209	621	2619	<LOD	481	17201	<LOD	<LOD	<LOD	<LOD
Sediment 5	17		68	749	<LOD	360	13358	<LOD	<LOD	<LOD	<LOD
Sediment 6	18	X208	197	1187	<LOD	491	12016	<LOD	<LOD	<LOD	<LOD
Sediment 6	19		89	1013	<LOD	496	13834	<LOD	<LOD	<LOD	<LOD
Sediment 6	20		107	774	<LOD	562	13983	<LOD	<LOD	<LOD	<LOD
Sediment 7	21		38	1052	<LOD	313	12684	<LOD	<LOD	<LOD	<LOD
Sediment 7	22		80	2301	<LOD	697	16590	<LOD	<LOD	<LOD	<LOD
Sediment 7	23		106	1187	<LOD	602	15432	<LOD	<LOD	<LOD	<LOD
Sediment 8	24		81	651	<LOD	462	13521	<LOD	<LOD	<LOD	<LOD
Sediment 8	25		123	625	<LOD	256	13795	<LOD	<LOD	<LOD	<LOD
Sediment 8	26		68	332	<LOD	202	12042	<LOD	<LOD	<LOD	<LOD
Sediment 9	27	X207	774	2959	<LOD	306	13632	<LOD	<LOD	<LOD	<LOD
Sediment 9	28		25	164	<LOD	403	18030	<LOD	<LOD	<LOD	<LOD
Sediment 9	29		19	176	<LOD	271	17478	<LOD	<LOD	<LOD	<LOD
Sediment 10	30		66	895	<LOD	464	13406	<LOD	<LOD	<LOD	<LOD
Sediment 10	31		349	1247	<LOD	327	13109	<LOD	<LOD	<LOD	<LOD
Sediment 10	32	X206	2000	9306	<LOD	1364	42751	<LOD	<LOD	<LOD	<LOD
Sediment 11	33		100	1568	<LOD	1785	17968	<LOD	<LOD	<LOD	<LOD
Sediment 11	34	X205	128	12438	<LOD	1453	26297	<LOD	<LOD	<LOD	<LOD
Sediment 11	35		123	2113	<LOD	1233	16874	<LOD	<LOD	<LOD	<LOD
Sediment 12	36	X204	83	6383	<LOD	2282	23875	<LOD	<LOD	<LOD	<LOD
Sediment 12	37		116	1778	<LOD	1212	24560	<LOD	<LOD	<LOD	<LOD
Sediment 12	38		57	2329	<LOD	751	19676	<LOD	<LOD	35	<LOD
Sediment 13	39		79	396	<LOD	1132	17590	<LOD	<LOD	<LOD	<LOD
Sediment 13	40		44	917	218	627	15292	<LOD	52	<LOD	<LOD
Sediment 13	41		30	180	<LOD	385	14039	<LOD	<LOD	<LOD	<LOD
Sediment 14	42		23	130	<LOD	323	14508	<LOD	<LOD	<LOD	<LOD
Sediment 14	43		32	203	<LOD	1946	17049	<LOD	<LOD	<LOD	<LOD
Sediment 14	44	X203	79	3405	<LOD	697	23667	<LOD	<LOD	<LOD	<LOD
Sediment 15	45		21	130	<LOD	241	13969	<LOD	<LOD	<LOD	<LOD
Sediment 15	49		<LOD	98	<LOD	277	14074	<LOD	<LOD	<LOD	<LOD
Sediment 15	50		17	113	<LOD	304	14374	<LOD	<LOD	<LOD	<LOD
Sediment 16	51		76	280	<LOD	367	17389	<LOD	<LOD	24	<LOD
Sediment 16	52		84	195	<LOD	311	13664	<LOD	<LOD	<LOD	<LOD
Sediment 16	53		524	767	<LOD	263	11409	<LOD	<LOD	<LOD	<LOD
Sediment 17	54		164	874	<LOD	1738	30928	<LOD	<LOD	<LOD	<LOD
Sediment 17	55		181	760	<LOD	1116	25915	<LOD	<LOD	<LOD	<LOD
Sediment 18	56		56	846	<LOD	324	12822	<LOD	<LOD	<LOD	<LOD
Sediment 18	57		557	773	<LOD	<LOD	13799	<LOD	<LOD	<LOD	<LOD
Sediment 19	2	X202	61	169	<LOD	<LOD	6652	<LOD	<LOD	<LOD	<LOD
Sediment 19	3		98	3157	<LOD	<LOD	14027	<LOD	<LOD	<LOD	<LOD
Sediment 20	4	X201-A	<LOD	198	<LOD	358	12631	<LOD	<LOD	<LOD	<LOD
Sediment 20	5	X201-B	17	90	<LOD	<LOD	16502	<LOD	<LOD	<LOD	<LOD
Sediment 21	6	X200	64	509	<LOD	287	14796	<LOD	<LOD	<LOD	<LOD
Sediment 22	3		170	987	<LOD	470	17665	<LOD	<LOD	<LOD	<LOD
Sediment 22	4		124	4181	<LOD	420	16328	<LOD	<LOD	<LOD	<LOD
Sediment 23	5		<LOD	205	<LOD	139	6107	<LOD	<LOD	<LOD	<LOD
Sediment 23	6		<LOD	212	<LOD	234	11617	<LOD	<LOD	<LOD	<LOD
Sediment 24	8		29	148	<LOD	734	23940	<LOD	<LOD	<LOD	<LOD
Sediment 24	9		22	155	<LOD	247	12399	<LOD	<LOD	<LOD	<LOD
Sediment 25	10		62	449	<LOD	332	13942	<LOD	<LOD	<LOD	<LOD
Sediment 25	11		306	1793	<LOD	430	16324	<LOD	<LOD	<LOD	<LOD
Sediment 26	12		28	306	226	247	13410	<LOD	<LOD	<LOD	<LOD
Sediment 26	13		19	171	<LOD	157	13473	<LOD	<LOD	<LOD	<LOD
Sediment 27	14	X219-A	17	100	<LOD	267	10192	<LOD	<LOD	<LOD	<LOD
Sediment 27	15	X219-B	16	110	<LOD	203	11624	<LOD	<LOD	<LOD	<LOD
Sediment 28	16		37	132	<LOD	137	9428	<LOD	<LOD	<LOD	<LOD
Sediment 28	17	X220	<LOD	92	<LOD	125	9478	<LOD	<LOD	<LOD	<LOD
Sediment 29	18	X221-A	<LOD	79	<LOD	450	16005	<LOD	<LOD	<LOD	<LOD
Sediment 29	19	X221-B	18	86	<LOD	298	12610	<LOD	<LOD	<LOD	<LOD

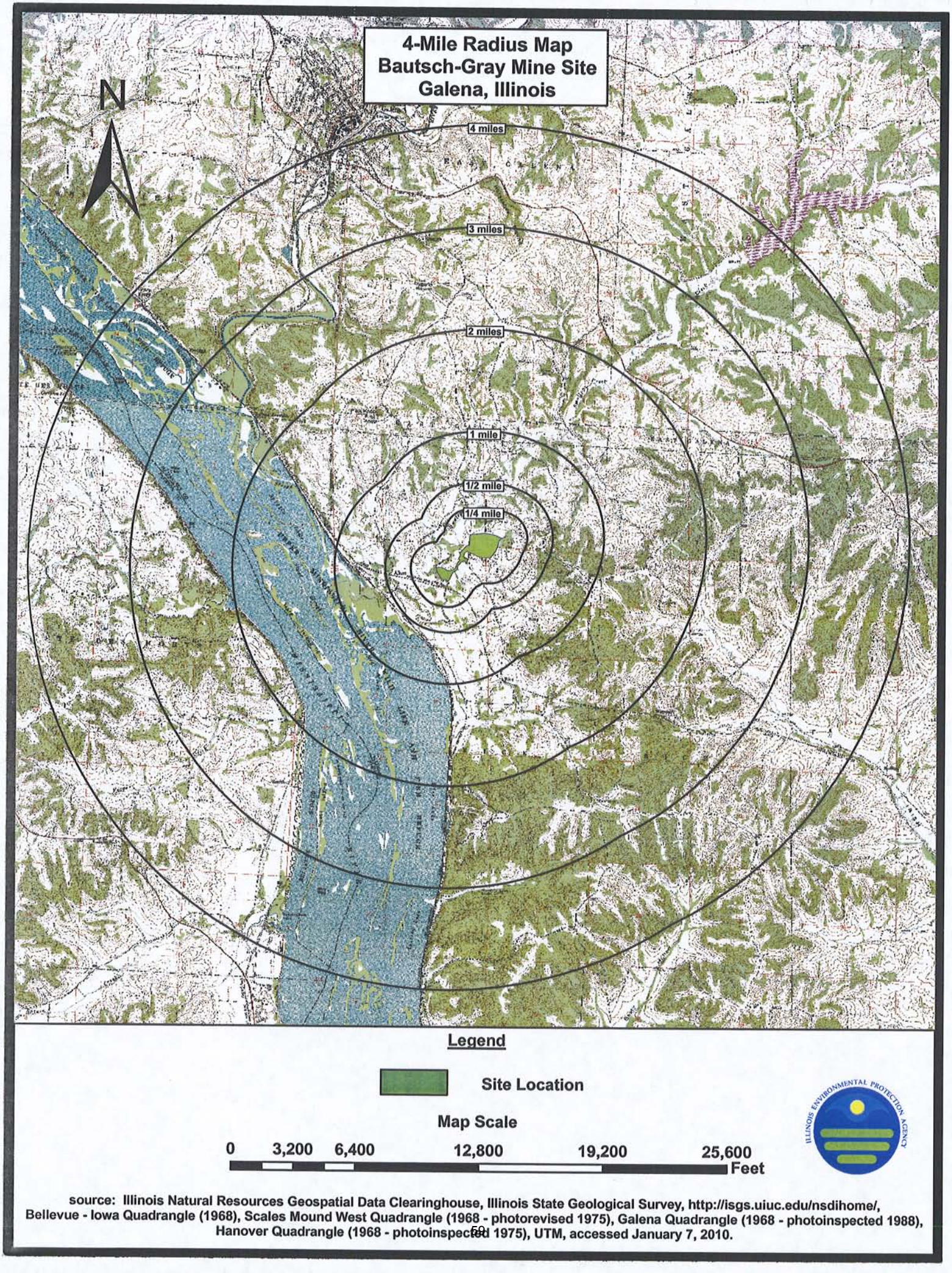
* all results are reported in parts per million (ppm)

<LOD - indicates Below the Detection of the XRF

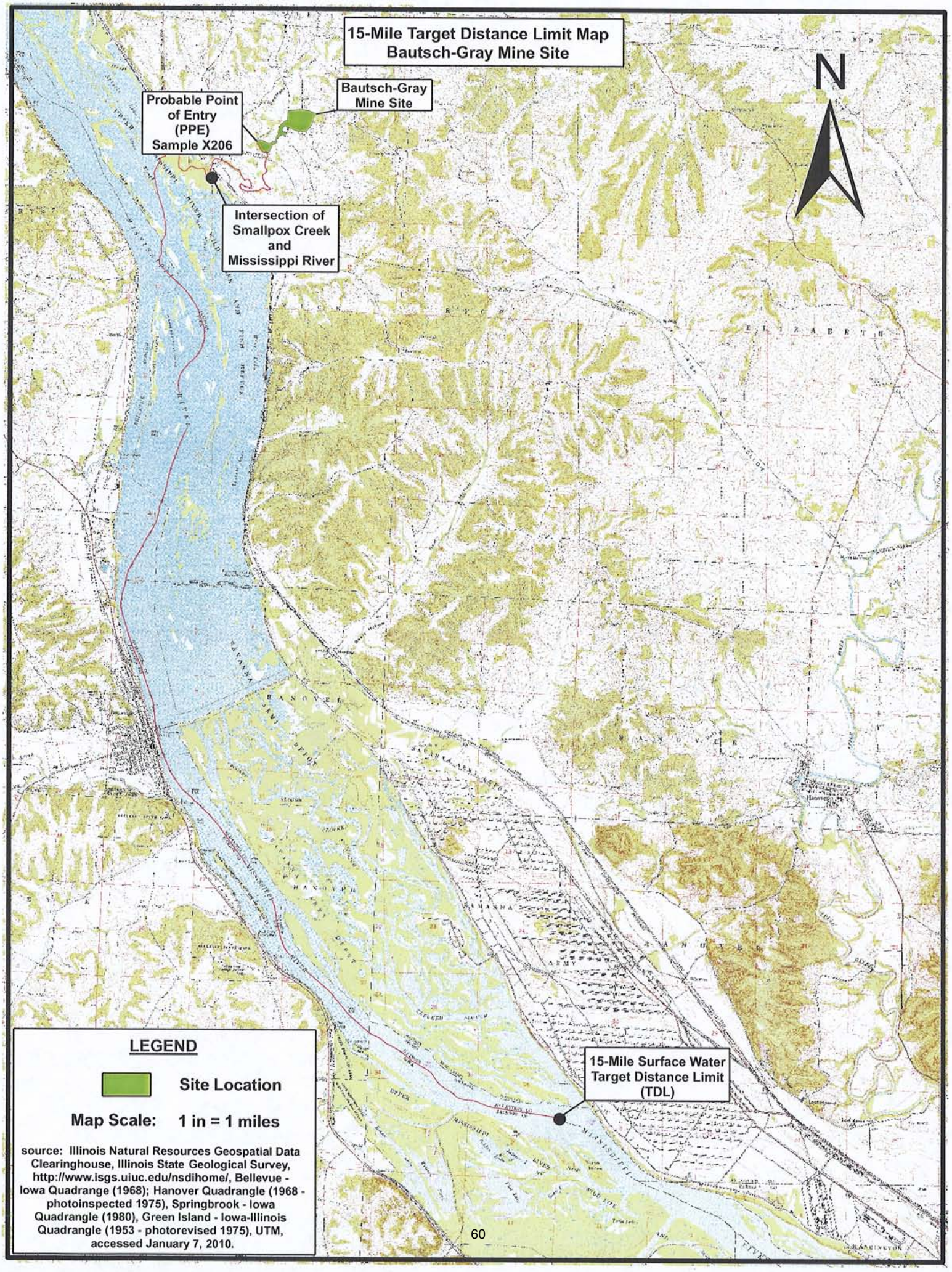
APPENDIX A

4-MILE RADIUS MAP

15-MILE SURFACE WATER ROUTE MAP



source: Illinois Natural Resources Geospatial Data Clearinghouse, Illinois State Geological Survey, http://isgs.uiuc.edu/nsdihome/, Bellevue - Iowa Quadrangle (1968), Scales Mound West Quadrangle (1968 - photorevised 1975), Galena Quadrangle (1968 - photoinspected 1988), Hanover Quadrangle (1968 - photoinspected 1975), UTM, accessed January 7, 2010.


15-Mile Target Distance Limit Map
Bautsch-Gray Mine Site
N
Bautsch-Gray Mine Site
Probable Point of Entry (PPE) Sample X206
Intersection of Smallpox Creek and Mississippi River
15-Mile Surface Water Target Distance Limit (TDL)
LEGEND
Site Location
Map Scale: 1 in = 1 miles
source: Illinois Natural Resources Geospatial Data Clearinghouse, Illinois State Geological Survey, http://www.isgs.uiuc.edu/nsdihome/, Bellevue - Iowa Quadrange (1968); Hanover Quadrangle (1968 - photoinspected 1975), Springbrook - Iowa Quadrangle (1980), Green Island - Iowa-Illinois Quadrangle (1953 - photorevised 1975), UTM, accessed January 7, 2010.

APPENDIX B

TARGET COMPOUND LIST

FOR

INORGANICS

Target Analyte List (TAL)
for
Metals and Cyanide

Element or Compound Name	Element or Compound Symbol	Contract Required Quantitation Limit (CRQL) mg/kg
Aluminum	Al	20
Antimony	Sb	6
Arsenic	As	1
Barium	Ba	20
Beryllium	Be	0.5
Cadmium	Cd	0.5
Calcium	Ca	500
Chromium	Cr	1
Cobalt	Co	5
Copper	Cu	2.5
Iron	Fe	10
Lead	Pb	1
Magnesium	Mg	500
Manganese	Mn	1.5
Mercury	Hg	0.1
Nickel	Ni	4
Potassium	K	500
Selenium	Se	3.5
Silver	Ag	1
Sodium	Na	500
Thallium	Tl	2.5
Vanadium	V	5
Zinc	Zn	6
Cyanide	CN	2.5

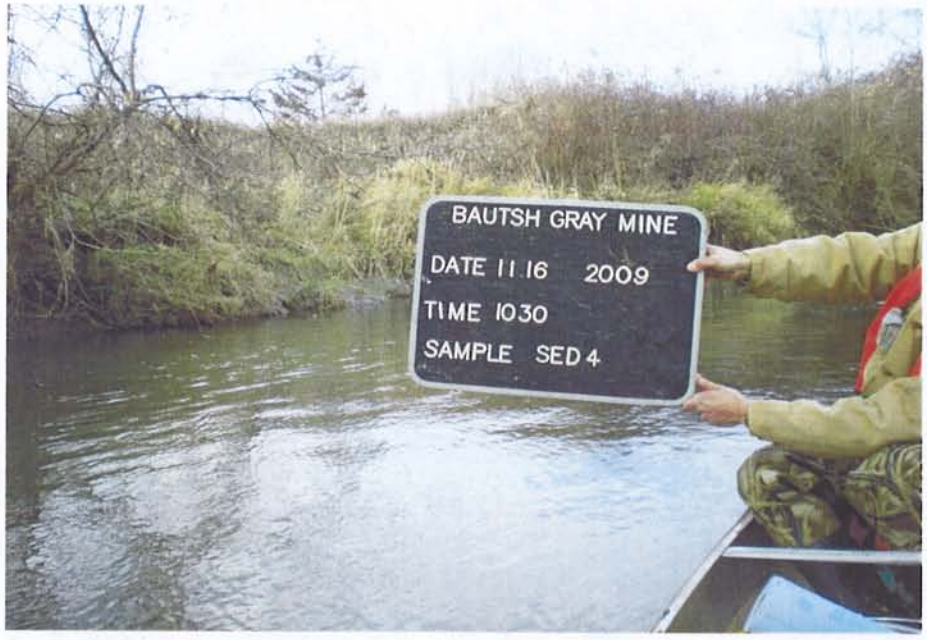
APPENDIX C

ILLINOIS EPA

SAMPLE PHOTOGRAPHS

SITE NAME:	Bautsch-Gray Mine	
CERCLIS ID:	ILN 000508088	COUNTY: Jo Daviess

DATE: November 16, 2009
TIME: 1030
PHOTO BY: B. Everetts
DIRECTION: Southeast
COMMENTS: Photo taken of Sediment Location #4 from which sediment sample X210 was collected. Sample X210 was taken from 6 - 12 inches within the sediments and below approximately 2.5 feet of water.



DATE: November 16, 2009
TIME: 1100
PHOTO BY: B. Everetts
DIRECTION: East
COMMENTS: Photo taken of Sediment Location #5 from which sediment sample X209 was collected. Sample X209 was taken from 6 - 12 inches within the sediments and below approximately 1.5 feet of water.

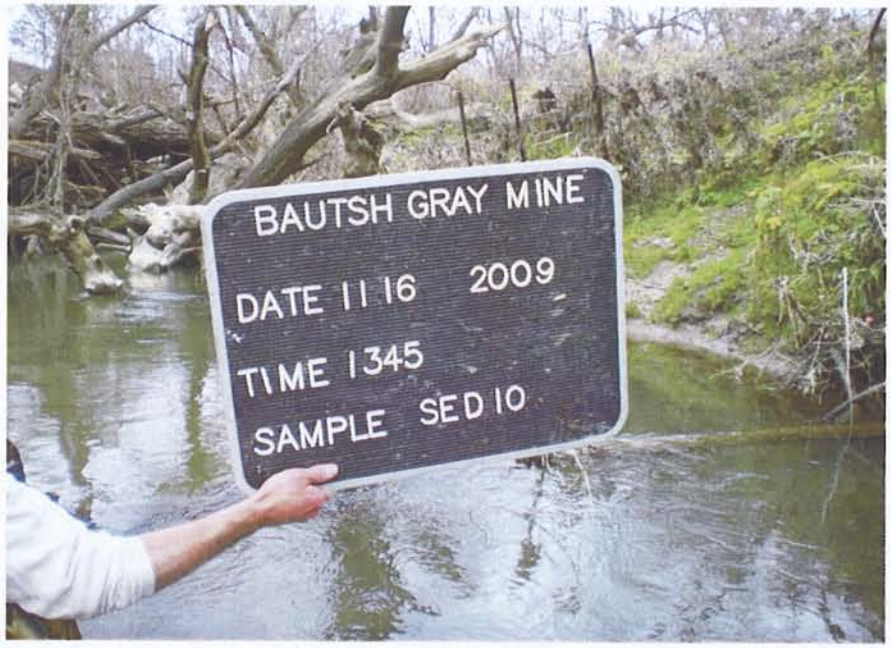
SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

DATE: November 16, 2009
TIME: 1130
PHOTO BY: B. Everetts
DIRECTION: East
COMMENTS: Photo taken of Sediment Location #6 from which sediment sample X208 was collected. Sample X208 was taken from 0 - 6 inches within the sediments and below approximately 2 feet of water.

DATE: November 16, 2009
TIME: 1315
PHOTO BY: B. Everetts
DIRECTION: North
COMMENTS: Photo taken of Sediment Location #9 from which sediment sample X207 was collected. Sample X207 was taken from 0 - 6 inches within the sediments and below approximatley 2 feet of water.

SITE NAME:	Bautsch-Gray Mine	
CERCLIS ID:	ILN 000508088	COUNTY: Jo Daviess

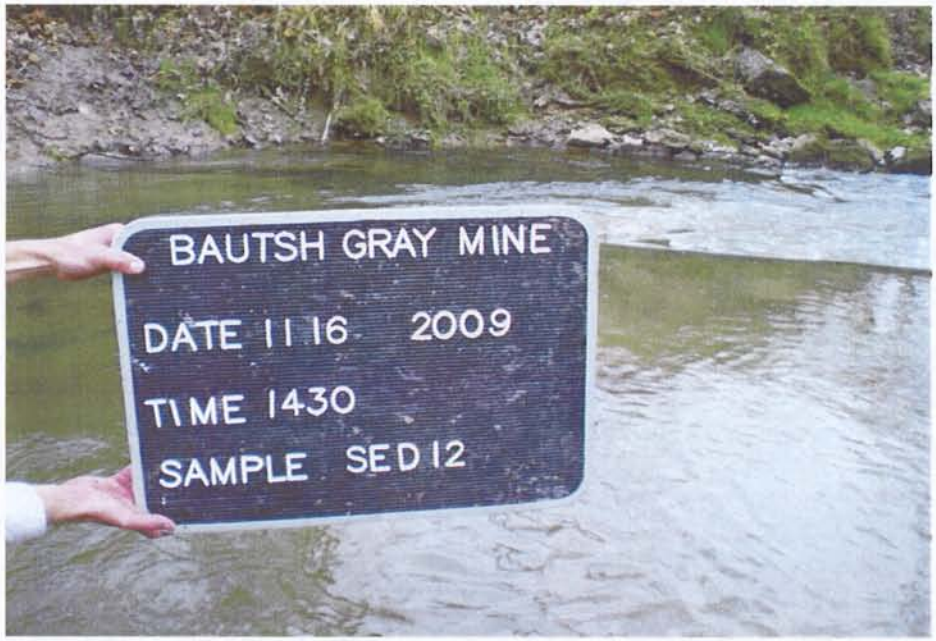
DATE: November 16, 2009
TIME: 1345
PHOTO BY: B. Everetts
DIRECTION: North
COMMENTS: Photo taken of Sediment Location #10 from which sediment sample X206 was collected. Sample X206 was taken from 12 - 24 inches within the sediment and below approximately 1.5 feet of water.



DATE: November 16, 2009
TIME: 1400
PHOTO BY: B. Everetts
DIRECTION: Northeast
COMMENTS: Photo taken of Sediment Location #11 from which sediment sample X205 was collected. Sample X205 was taken from 6 - 12 inches within the sediment and below approximatley 1.5 feet of water.

SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

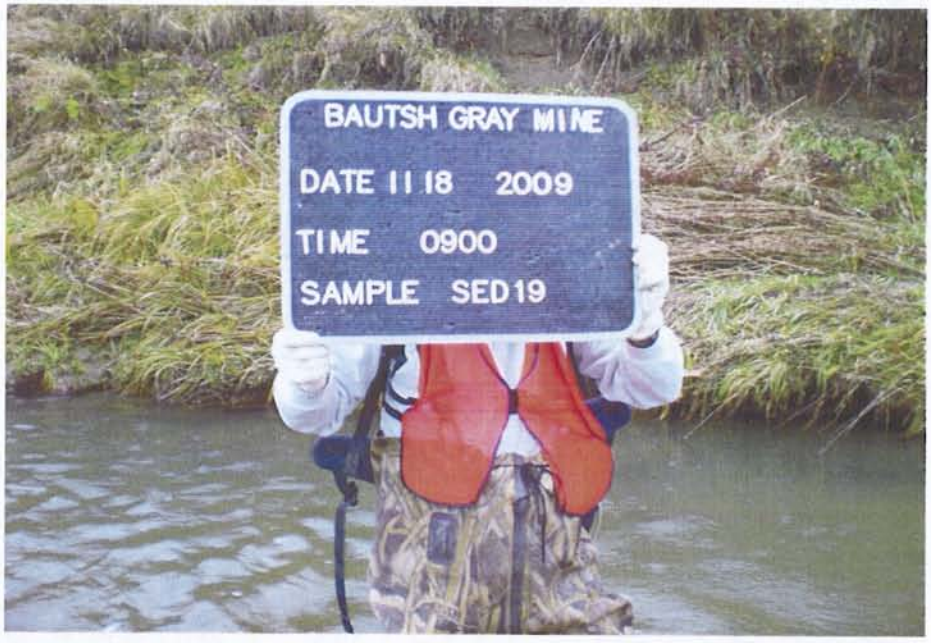
DATE: November 16, 2009
TIME: 1430
PHOTO BY: B. Everetts
DIRECTION: South
COMMENTS: Photo taken of Sediment Location #12 from which sediment sample X204 was collected. Sample X204 was taken from 0 - 6 inches within the sediment and below approximately 2 feet of water.



DATE: November 16, 2009
TIME: 1530
PHOTO BY: B. Everetts
DIRECTION: East
COMMENTS: Photo taken of Sediment Location #14 from which sediment sample X203 was collected. Sample X203 was taken from 12 - 24 inches within the sediment and below approximately 3 feet of water.

SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

DATE: November 18, 2009
TIME: 0900
PHOTO BY: B. Everetts
DIRECTION: Northwest
COMMENTS: Photo taken of Sediment Location #19 from which sediment sample X202 was collected. Sample X202 was taken from 0 - 6 inches within the sediment and below approximately 2 feet of water.



DATE: November 18, 2009
TIME: 0920
PHOTO BY: B. Everetts
DIRECTION: Southwest
COMMENTS: Photo taken of Sediment Location #20 from which sediment samples X201-A and X201-B were collected. Sample X201-A was taken from 0 - 6 inches and X201-B was taken from 6 - 12 inches within the sediments. Both samples were collected beneath approximately 1.5 feet of water.

SITE NAME:	Bautsch-Gray Mine
CERCLIS ID:	ILN 000508088
COUNTY:	Jo Daviess

DATE: November 18, 2009
TIME: 0945
PHOTO BY: B. Everetts
DIRECTION: South
COMMENTS:
Photo taken of Sediment Location #21 from which sediment sample X200 was collected. Sample X200 was taken from 6 - 12 inches within the sediments and below approximately 1.5 feet of water.

DATE: November 17, 2009
TIME: 0900
PHOTO BY: B. Everetts
DIRECTION: Northwest
COMMENTS:
Photo taken of sediment sample X211 which was collected from the wetland located northwest of the Bautsch-Gray Mine Site.

SITE NAME:	Bautsch-Gray Mine	
CERCLIS ID:	ILN 000508088	COUNTY: Jo Daviess

DATE: November 17, 2009
TIME: 0945
PHOTO BY: B. Everetts
DIRECTION: Northeast
COMMENTS: Photo taken of sediment sample X212 which was collected from the wetland located northwest of the Bautsch-Gray Mine Site.

DATE: November 17, 2009
TIME: 1000
PHOTO BY: B. Everetts
DIRECTION: Southwest
COMMENTS: Photo taken of sediment sample X213 which was collected from the wetland located northwest of the Bautsch-Gray Mine Site.

SITE NAME:	Bautsch-Gray Mine
CERCLIS ID:	ILN 000508088
COUNTY:	Jo Daviess

DATE: November 17, 2009
TIME: 1020
PHOTO BY: B. Everetts
DIRECTION: South
COMMENTS: Photo taken of sediment sample X214 which was collected from the wetland located northwest of the Bautsch-Gray Mine Site.

DATE: November 17, 2009
TIME: 1250
PHOTO BY: B. Everetts
DIRECTION: South
COMMENTS: Photo taken of soil sample X103 which was located along the overland flow route leading from the surface impoundment to Smallpox Creek. This location is approximately 50 feet east of Smallpox Creek.

SITE NAME:	Bautsch-Gray Mine	
CERCLIS ID:	ILN 000508088	COUNTY: Jo Daviess

DATE: November 17, 2009
TIME: 1320
PHOTO BY: B. Everetts
DIRECTION: Southwest
COMMENTS: Photo taken of soil samples X104 and X105 which was collected along the overland flow route leading from the surface impoundment to Smallpox Creek. Sample X105 is a field duplicate of X104.

DATE: November 17, 2009
TIME: 1330
PHOTO BY: B. Everetts
DIRECTION: East
COMMENTS: Photo taken of soil sample X206 which was collected along the overland flow route leading from the surface impoundment to Smallpox Creek.

SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

DATE: November 17, 2009
TIME: 1345
PHOTO BY: B. Everetts
DIRECTION: Northeast
COMMENTS: Photo taken of soil sample X107 which was collected from the overland flow route leading from the surface impoundment to Smallpox Creek. ***note: the berm of the surface impoundment in the background.**

DATE: November 17, 2009
TIME: 1350
PHOTO BY: B. Everetts
DIRECTION: Northeast
COMMENTS: Photo taken of soil sample X108 which was collected from the overland flow route leading from the surface impoundment to Smallpox Creek. The berm of the surface impoundment can be seen in the background.

SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

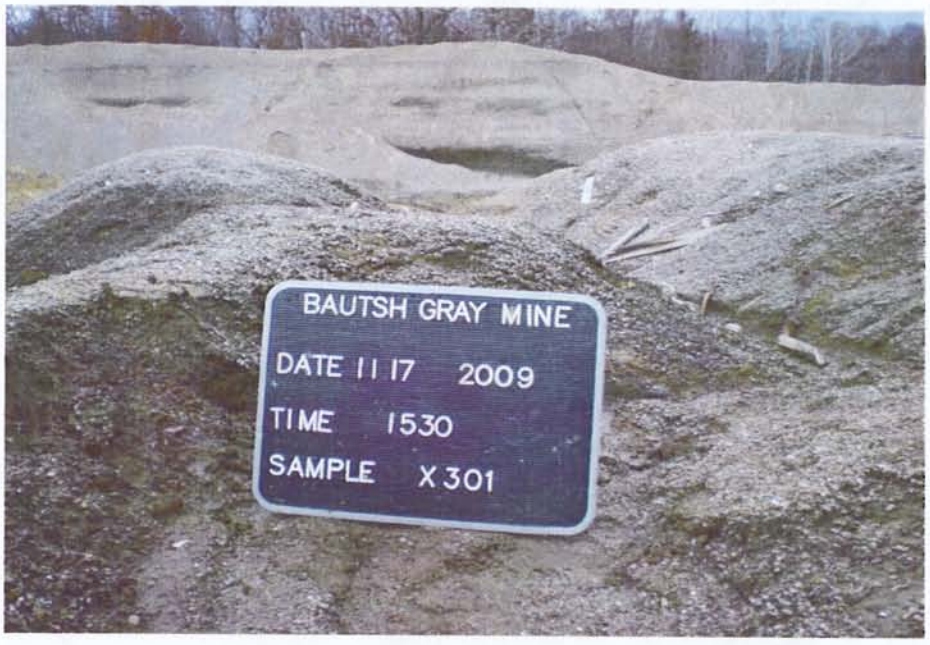
DATE: November 17, 2009
TIME: 1400
PHOTO BY: B. Everetts
DIRECTION: Southeast
COMMENTS: Photo taken of sediment sample X215 which was collected from the surface impoundment east of the Bautsch-Gray Mine waste pile.

DATE: November 17, 2009
TIME: 1415
PHOTO BY: B. Everetts
DIRECTION: Northeast
COMMENTS: Photo taken of sediment sample X216 which was collected from the surface impoundment located east of the Bautsch-Gray Mine waste pile. The waste pile can be seen in the background.

SITE NAME:	Bautsch-Gray Mine
CERCLIS ID:	ILN 000508088
COUNTY:	Jo Daviess

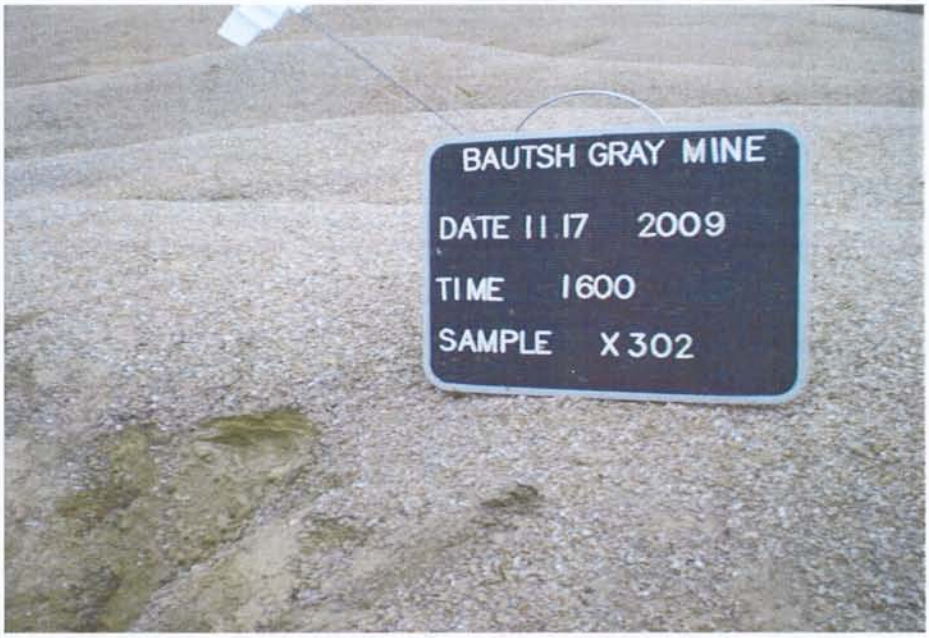
DATE: November 17, 2009
TIME: 1420
PHOTO BY: B. Everetts
DIRECTION: East
COMMENTS:
Photo taken of sediment samples X217 and X218 which was collected from the surface impoundment located east of the Bautsch-Gray Mine waste pile. The waste pile can be seen in the background. Sample X218 is a field duplicate of sample X217.

DATE: November 17, 2009
TIME: 1530
PHOTO BY: Jim Salch
DIRECTION: Northwest
COMMENTS:
Photo taken of Sample X301 which was collected southwest portion of the waste pile.

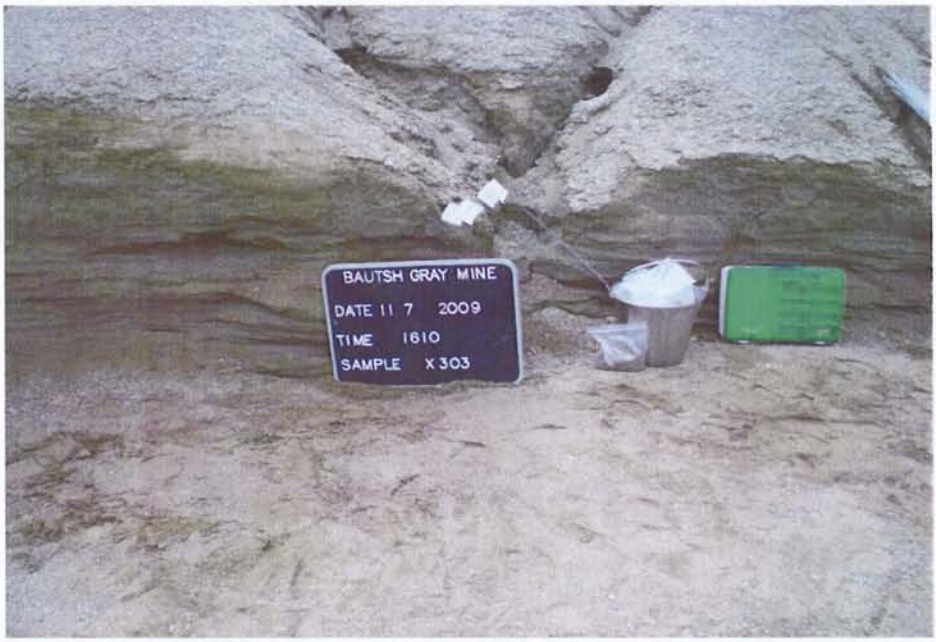


SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

DATE: November 17, 2009
TIME: 1600
PHOTO BY: Jim Salch
DIRECTION: West
COMMENTS: Photo taken of Sample X302 which was collected from the southeastern portion of the waste pile.

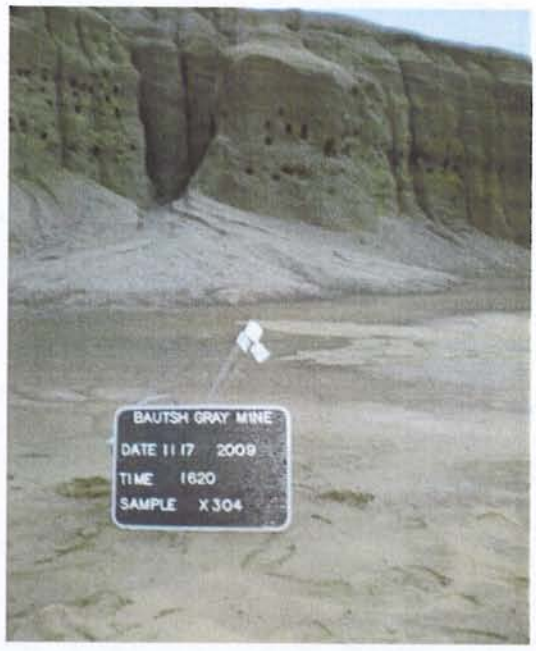


DATE: November 17, 2009
TIME: 1610
PHOTO BY: B. Everetts
DIRECTION: West
COMMENTS: Photo taken of Sample X303 which was collected from the northeastern portion of the waste pile.



SITE NAME:	Bautsch-Gray Mine	
CERCLIS ID:	ILN 000508088	COUNTY: Jo Daviess

DATE: November 17, 2009
TIME: 1620
PHOTO BY: B. Everetts
DIRECTION: Southwest
COMMENTS:
Photo taken of Sample X304 which was collected from the central portion of the waste pile.



DATE: November 17, 2009
TIME: 1630
PHOTO BY: B. Everetts
DIRECTION: West
COMMENTS:
Photo taken of Sample X305 which was collected from northern portion of the waste pile.

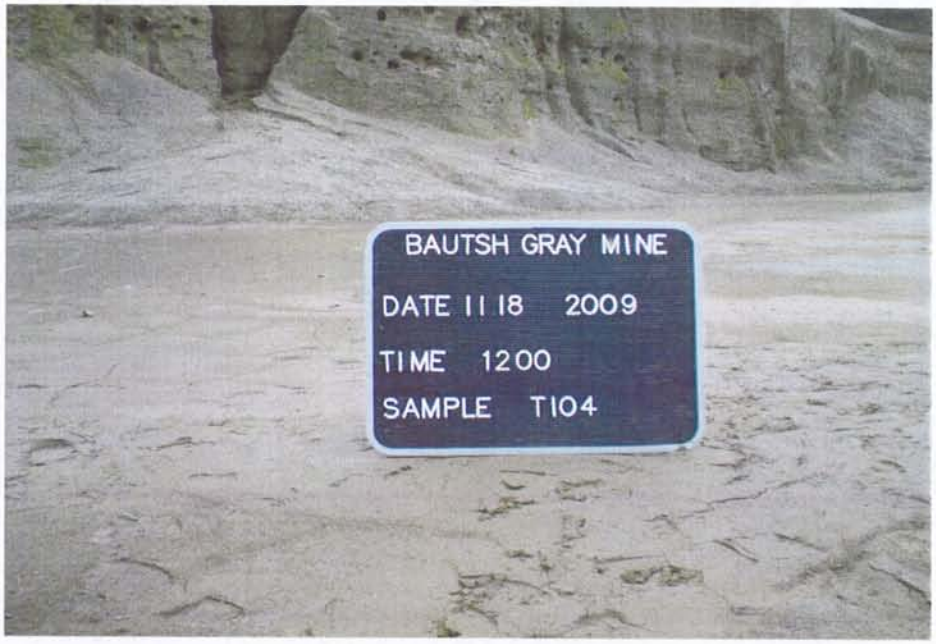
SITE NAME:	Bautsch-Gray Mine	
CERCLIS ID:	ILN 000508088	COUNTY: Jo Daviess

DATE: November 18, 2009
TIME: 1030
PHOTO BY: B. Everetts
DIRECTION: North
COMMENTS: Photo taken of Sample T101 which was taken along the overland flow route leading from the surface impoundment to Smallpox Creek.

DATE: November 18, 2009
TIME: 1045
PHOTO BY: B. Everetts
DIRECTION: Northeast
COMMENTS: Photo taken of Sample T102 and T103 which was collected from the surface impoundment located west of the Bautsch-Gray Mine waste pile. Sample T103 is a field duplicate of Sample T102.

SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

DATE: November 18, 2009
TIME: 1200
PHOTO BY: B. Everetts
DIRECTION: Southwest
COMMENTS:
Photo taken of Sample T104 which was collected from the central portion of the waste pile.



DATE: November 18, 2009
TIME: 1400
PHOTO BY: B. Everetts
DIRECTION:South
COMMENTS:
Photo taken of Sample X101 which was collected from a wooded area just south of the waste pile.

SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

DATE: November 18, 2009
TIME: 1440
PHOTO BY: B. Everetts
DIRECTION: South
COMMENTS:
Photo taken of Sample X102 which was collected from a wooded area located just north of the waste pile.

DATE: November 17, 2009
TIME: 1350
PHOTO BY: B. Everetts
DIRECTION: East
COMMENTS:
Photo taken of the broken berm located along the western boundary of the surface impoundment.

SITE NAME:	Bautsch-Gray Mine
CERCLIS ID:	ILN 000508088
COUNTY:	Jo Daviess

DATE: November 17, 2009
TIME: 1320
PHOTO BY: B. Everetts
DIRECTION: Southwest
COMMENTS: Photo taken of the flow of surface water along the overland flow route that is migrating toward Smallpox Creek. This view is looking toward Smallpox Creek.

DATE: November 17, 2009
TIME: 1320
PHOTO BY: B. Everetts
DIRECTION: Northeast
COMMENTS: Photo taken of the flow of surface water along the overland flow route leading from the surface impoundment to Smallpox Creek. This view is looking away from Smallpox Creek.

SITE NAME:	Bautsch-Gray Mine		
CERCLIS ID:	ILN 000508088	**COUNTY:**	Jo Daviess

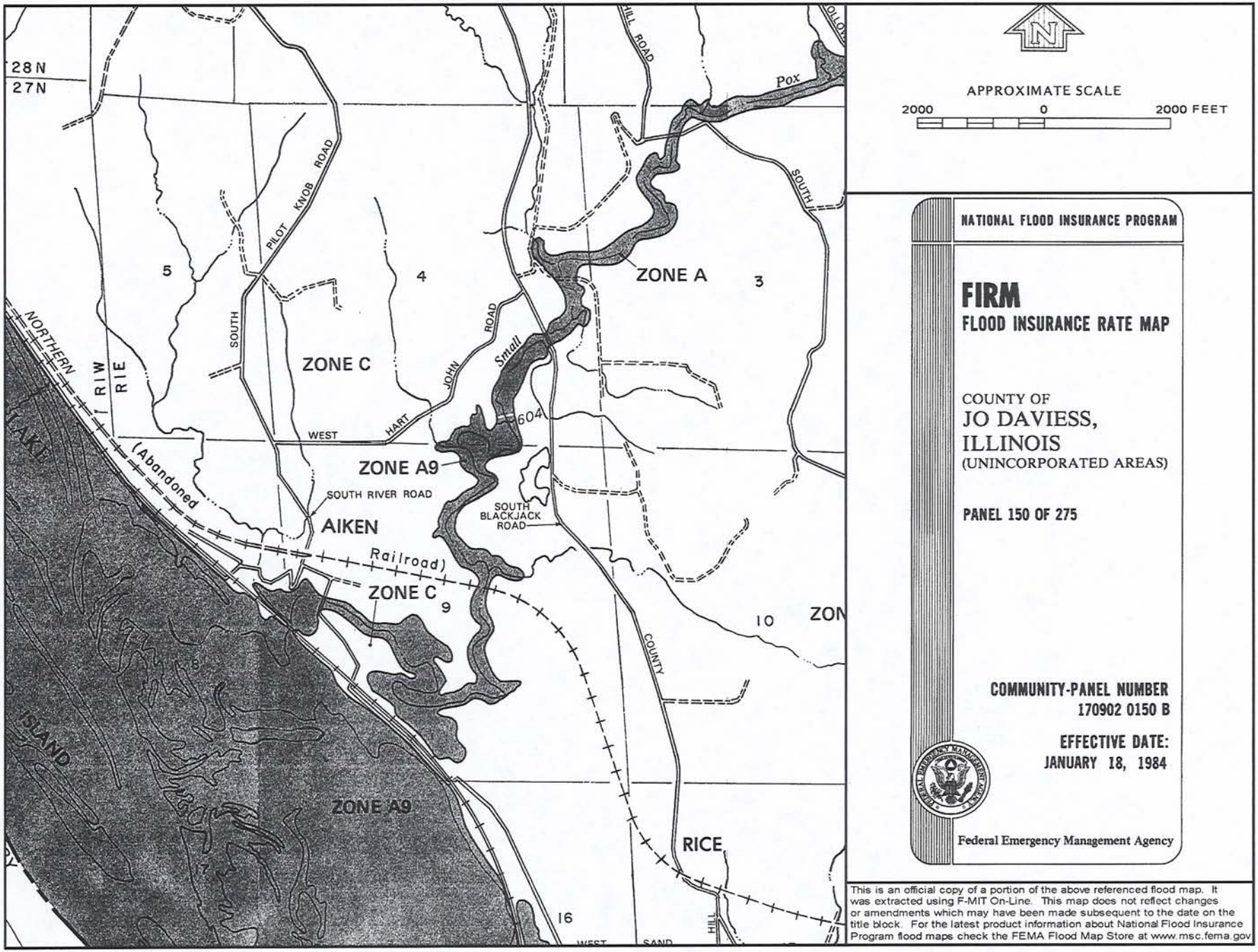
DATE: November 18, 2009
TIME: 1200
PHOTO BY: B. Everetts
DIRECTION:South
COMMENTS: Photo taken of the bird dwellings that have been formed in the side wall of the waste pile.

DATE:
TIME:
PHOTO BY:
DIRECTION:
COMMENTS:

APPENDIX D

FEMA

FLOOD INSURANCE MAP


28N
27N
PILOT KNOB ROAD
SOUTH
ZONE A
ZONE C
ZONE A9
NORTHERN
(Abandoned
Railroad)
SOUTH RIVER ROAD
AIKEN
SOUTH BLACKJACK ROAD
JOHN
HART
WEST
Small
604
COUNTY
ROAD
ZONE A9
RICE
ISLAND
LAKE
APPROXIMATE SCALE
2000 0 2000 FEET
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
COUNTY OF
JO DAVIESS,
ILLINOIS
(UNINCORPORATED AREAS)
PANEL 150 OF 275
COMMUNITY-PANEL NUMBER
170902 0150 B
EFFECTIVE DATE:
JANUARY 18, 1984
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

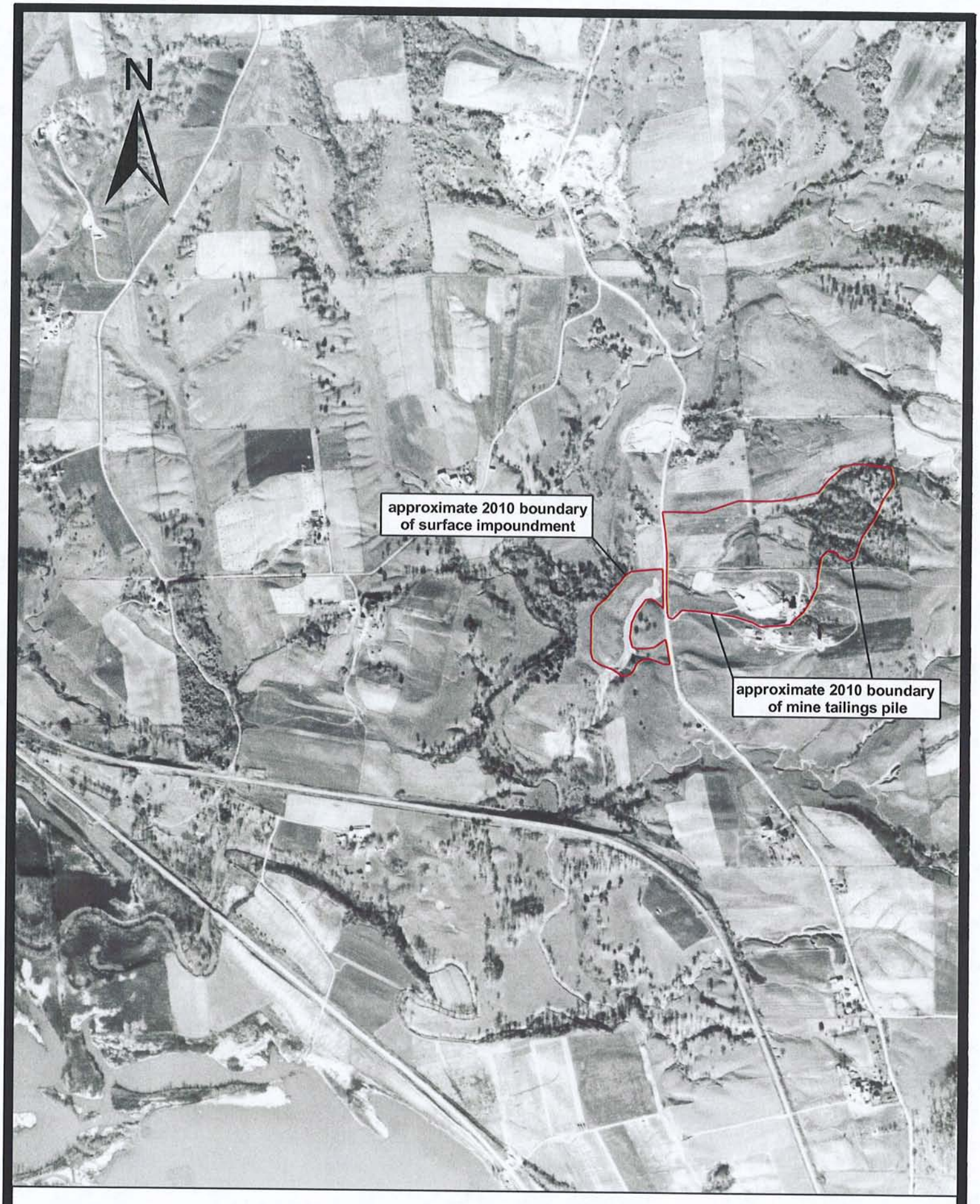
APPENDIX E

1946 AERIAL PHOTOGRAPH

1970 AERIAL PHOTOGRAPH

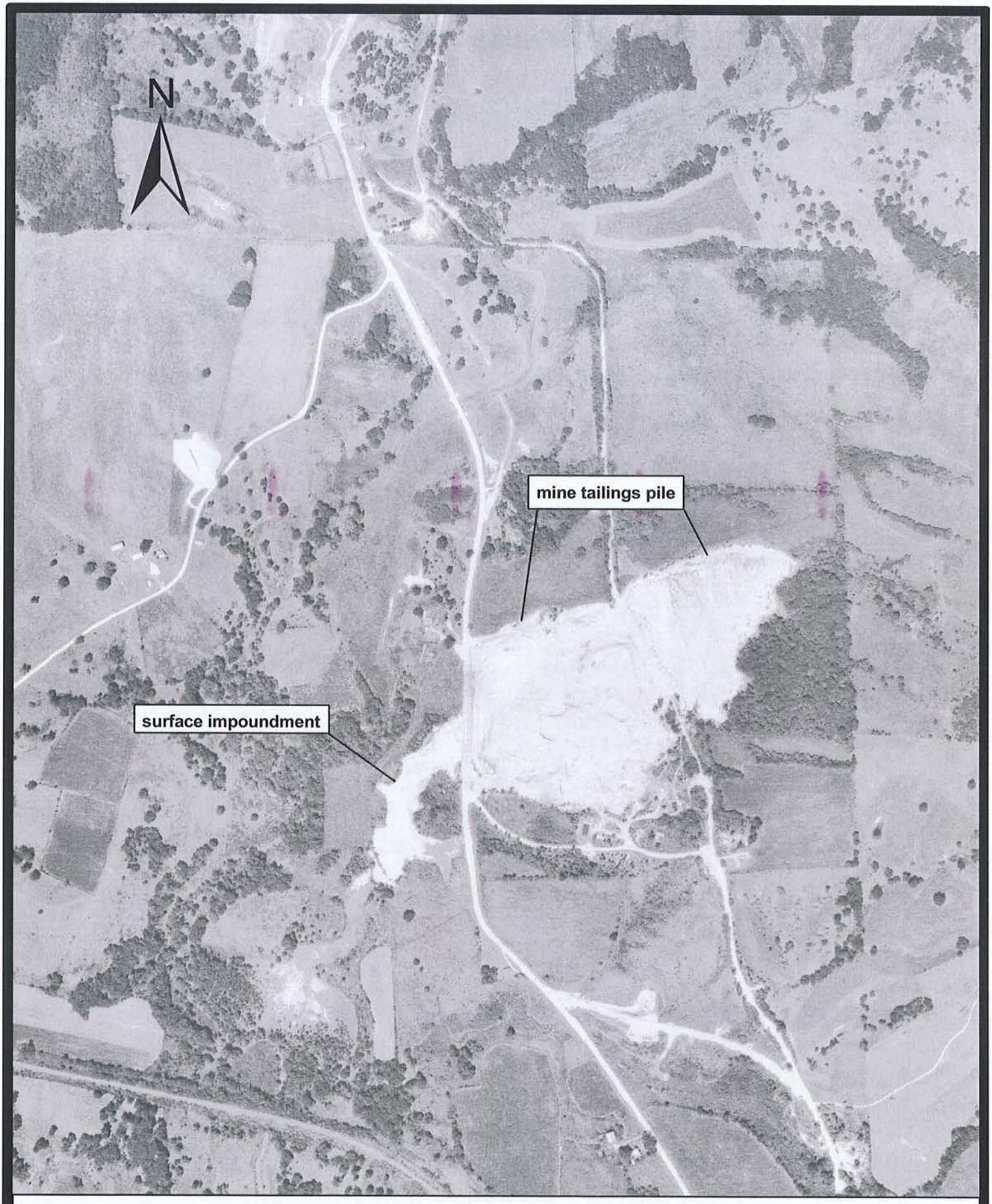
AND

EAGLE PICHER SITE MAPS



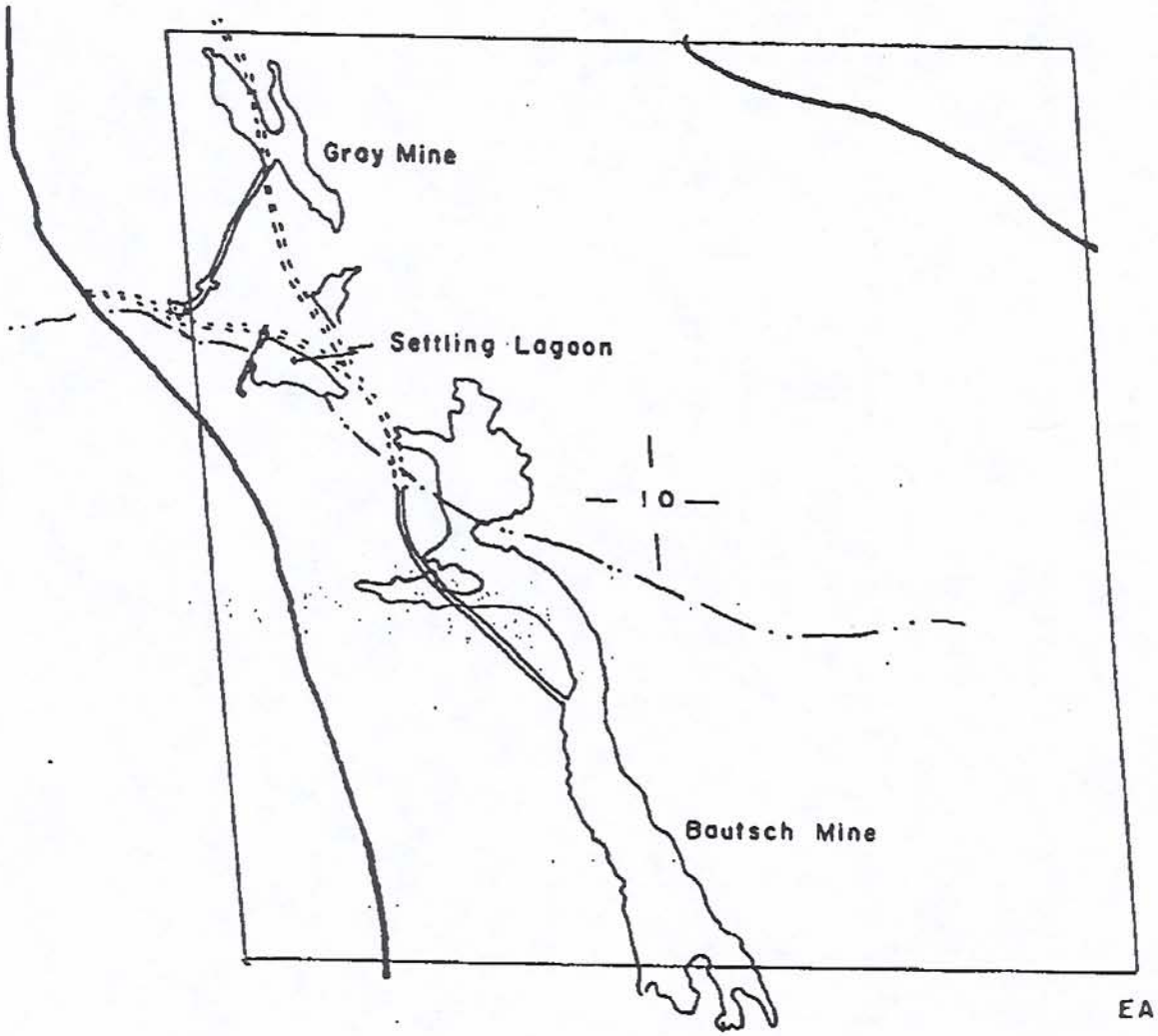
Map Not to Scale

Source: Illinois Natural Resources Geospatial Data Clearinghouse, Illinois State Geological Survey, http://www.isgs.edu/nsdihome/, Illinois Historical Aerial Photography, Flight BWT-2D-87, November 5, 1946.



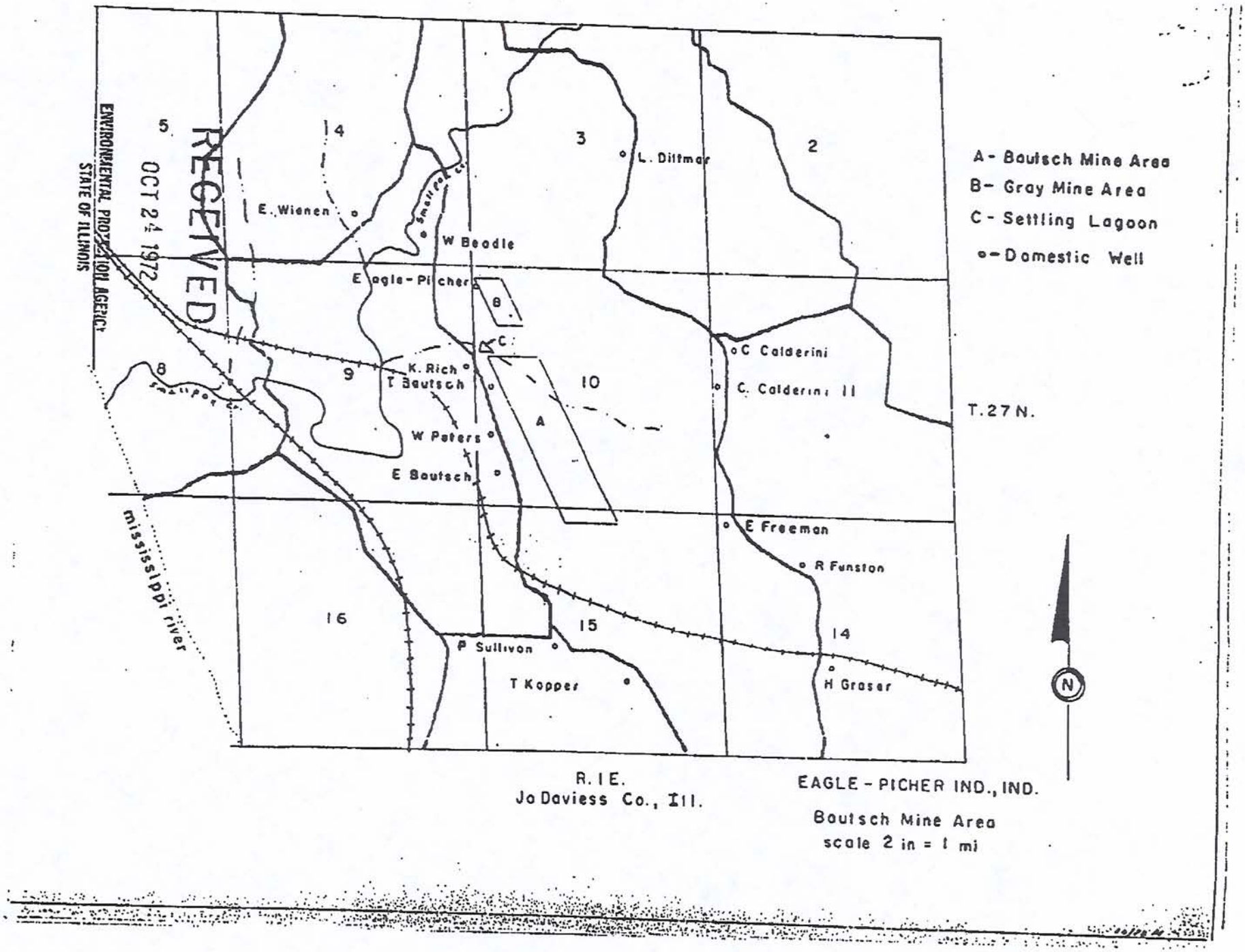
Map Not to Scale

Source: Illinois Department of Transportation - Aerial Surveys, Bautsch-Gray Mine Site - Jo Daviess County
Flight BWT-3LL-128, July 21, 1970



T.27N. R.1E.
Jo Daviess Co., Ill.

EAGLE-PICHER IND., INC.
Bautsch Mine Area
scale 1"= 1000'


RECEIVED
OCT 24 1972
ENVIRONMENTAL PROTECTION AGENCY
STATE OF ILLINOIS
A - Boutsch Mine Area
B - Gray Mine Area
C - Settling Lagoon
o - Domestic Well
E. Wienen
W Beadle
Eagle-Picher
L. Diltmar
C Calderini
C. Calderini II
K. Rich
T Boutsch
W Peters
E Boutsch
E Freeman
R Funston
P Sullivan
T Kopper
H Graser
mississippi river
T.27 N.
R.1E.
Jo Daviess Co., Ill.
EAGLE - PICHER IND., IND.
Boutsch Mine Area
scale 2 in = 1 mi